

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR

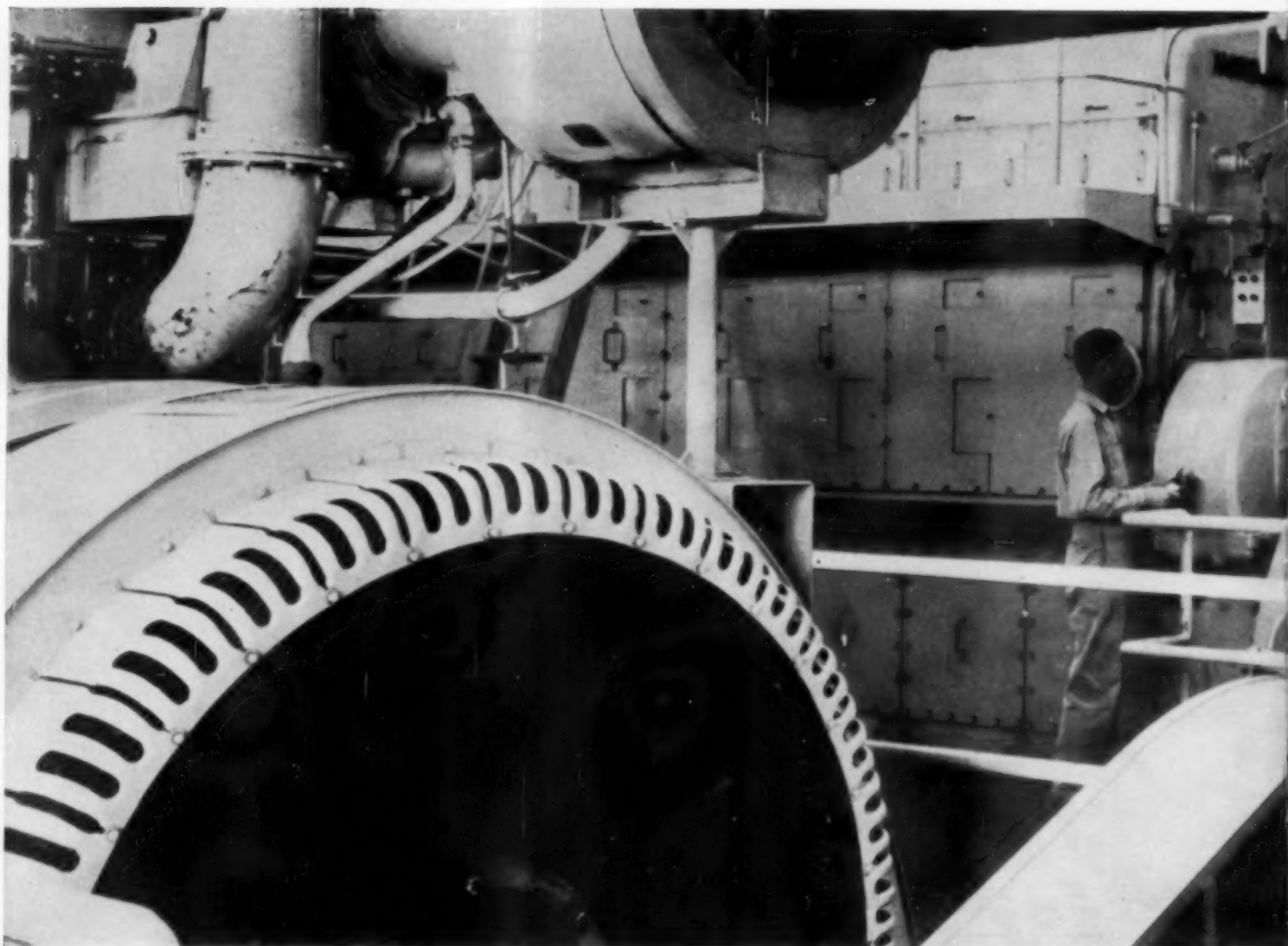
DIESEL PROGRESS



FIVE DOLLARS PER YEAR

OCTOBER, 1958

FIFTY CENTS PER COPY

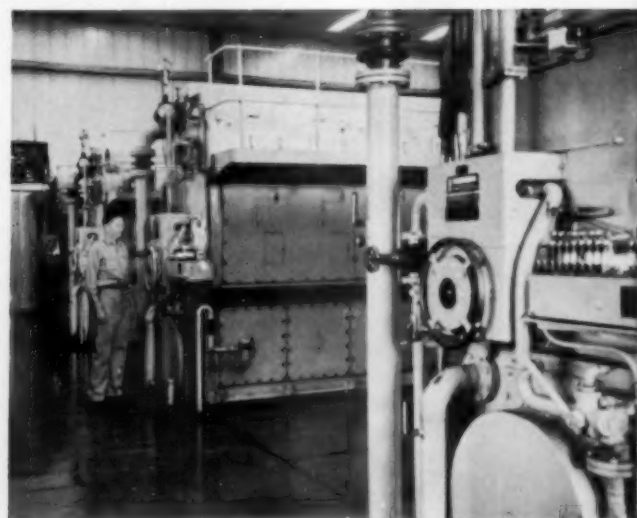


EFFICIENCY AWARD for 1957 (Division A) goes to Federated Rural Electric Assn. for producing power at the low cost of only

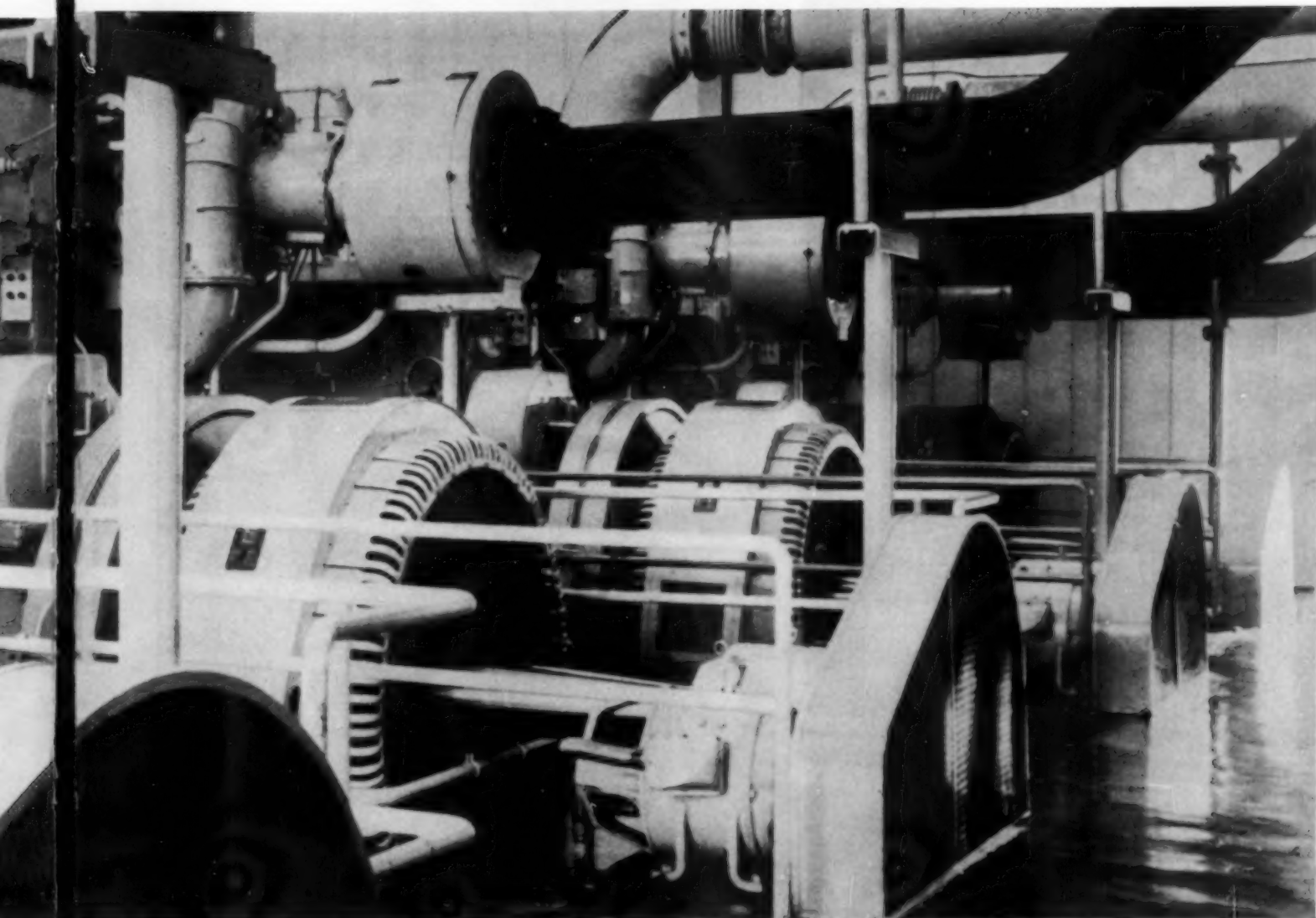
"MOST EFFICIENT" REA



A GOOD NEIGHBOR as well as an efficient one, Federated's modern plant is handsomely landscaped, and the engines exhaust into Maxim silencers.



POWERFUL PERFORMERS stay powerful with Texaco Lubrication. Each 8-cylinder 4-cycle Nordberg Dualfuel engine is rated at 1750 hp at 327 rpm.



6.54 mills per kwh. Manager Paul L. Ferguson reports that "Lubrication with Texaco Ursa Oil Heavy Duty, and frequent thorough

engine checks, have kept average liner wear (all engines, all cylinders) down to 0.005" after 33,000 hours operation."

plant wins title with Texaco

A combination of rigid maintenance standards and the use of Texaco Ursa Oil Heavy Duty has won two *Diesel Progress* awards for efficiency for Federated Rural Electric Association, Jackson, Minn. In 1954, and again for 1957, Federated was named "the most efficiently operated of all REA internal combustion plants." This is how Texaco has helped Federated stay on top:

Texaco Ursa Oil Heavy Duty keeps engines clean, for maximum efficiency. It prevents formation of sludge, keeps the rings free and compression high, so the engine uses less fuel, and runs longer between scheduled overhauls.

Minimizes wear, too. Texaco Ursa Oil Heavy Duty is a premium quality lubricant, one of the

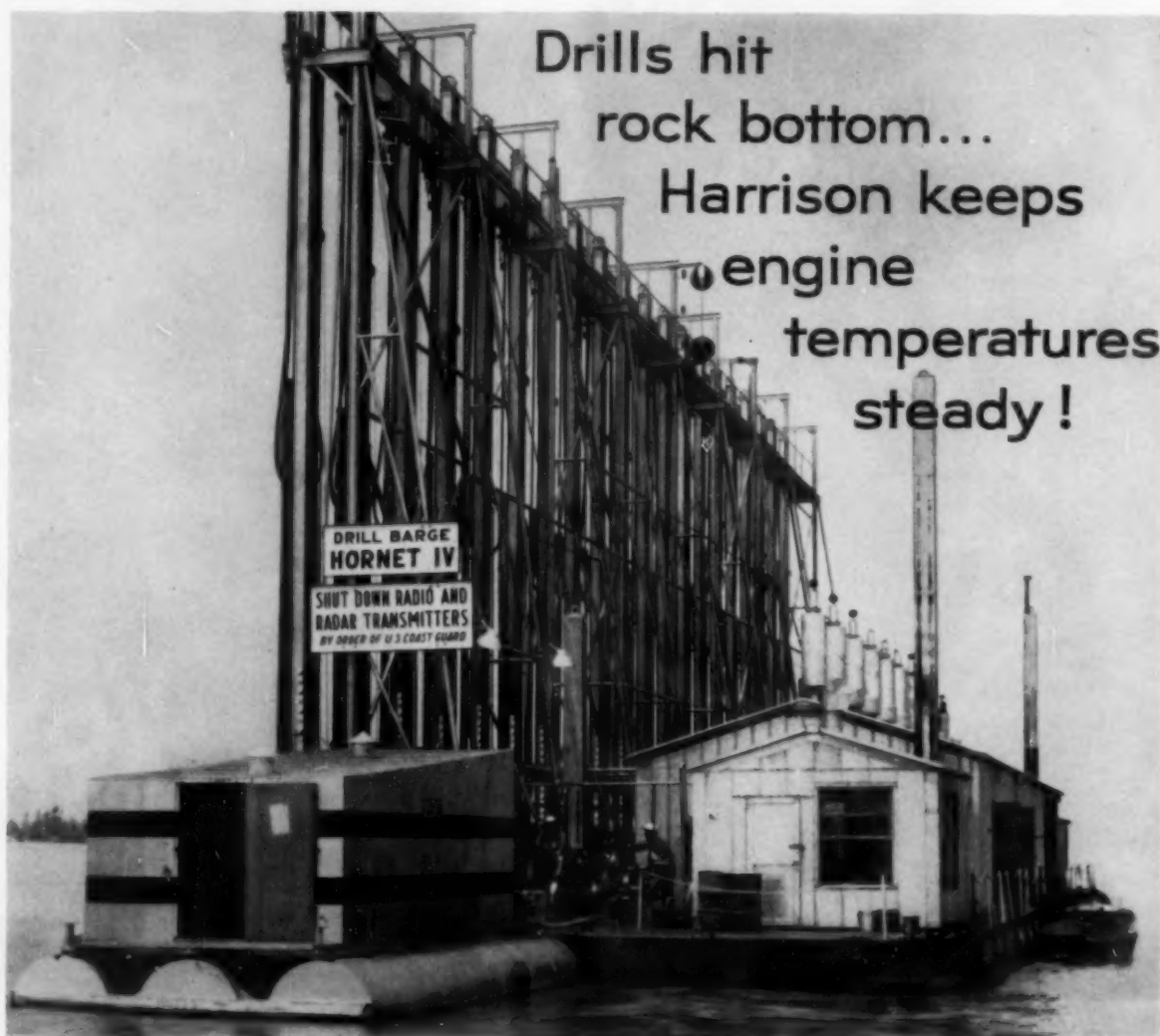
complete line of Texaco Ursa Oils especially refined and processed to lubricate diesel, gas and dual-fuel engines. For details on what Texaco Ursa Oils can do in your plant, call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.



LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)



**FROM GENERAL MOTORS . . . TEMPERATURES MADE TO ORDER
HARRISON-COOLED GM DIESEL POWER HELPS MAKE WAY FOR THE SEAWAY!**



Harrison Heat Exchangers
—Top-Quality Products
of General Motors Research and Engineering.



This drill barge bites through solid rock around the clock to clear the way for the Seaway. And Harrison-cooled GM Diesels provide dependable power every minute! Harrison heat exchangers are found on jobs where reliability and stamina are required. They're rugged, reliable and always in control of vital engine temperatures. Every Harrison heat exchanger is the product of over 48 years' experience . . . assuring you of top quality and engineering excellence. That's why you'll find Harrison at work, cooling Diesels in every line of industry and defense. If you have a cooling problem, look to Harrison for the answer.



AIRCRAFT, AUTOMOTIVE, MARINE AND INDUSTRIAL HEAT EXCHANGERS

HARRISON RADIATOR DIVISION, GENERAL MOTORS CORPORATION, LOCKPORT, NEW YORK

DIESEL and GAS TURBINE PROGRESS

REX W. WADMAN *Editor and Publisher*

MEMBER OF



Business Publications Audit
of Circulation, Inc.

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR

BRUCE W. WADMAN *Executive Vice Pres.*
ROBERT E. SCHULZ *Managing Editor*
JAMES W. BROWN *Midwest Editor*
F. HAL HIGGINS *Western Field Editor*
DONALD M. TAYLOR *Southwest Editor*
PEGGY R. TOMACK *Production Manager*

MEMBER OF



Verified Audit Circulation
Company

DIESEL PROGRESS for October, 1958, Vol. XXIV, No. 10. Published Monthly by Diesel Engines, Inc., 1701 W. Wisconsin Ave., Milwaukee 3, Wisc. Phone Division 4-5333. Subscription rates are \$5.00 for U.S.A. and possessions. All other countries \$7.50 per year. Subscriptions may be paid the London Office at £2-12s-6d per year. Accepted as Controlled Circulation Publication at Long Prairie, Minnesota.

DIESEL PROGRESS is indexed regularly by Engineering Index, Inc. and is available in microfilm editions from University Microfilms, Inc., Ann Arbor, Michigan.

MEMBER OF



Magazine Publishers
Association, Inc.

CONTENTS FOR OCTOBER, 1958

Cushing, Oklahoma	25
Two New Diesels From International	28
Consolidation Coal Adds <i>M/V Humphrey</i> To Fleet	30
Diesels Help Produce And Deliver Carthage Marble	32
Proper Selection And Installation Of Diesel Lubricating Oil Pumps	34
World-Wide Diesel Tractor Developments	36
New Concepts Of Gas Turbine Application	38
Ocean-Racing Auxiliary Ketch <i>Kamalii</i>	40
How To Predict Turbocharged Engine Performance With Varying Conditions	42
The Gas Turbine Goes To Sea	45
Pipe-Laying Barge <i>L. E. Minor</i>	46
Filtration Of Diesel Engine Oils	48
2400 HP Diesel Tug <i>Savannah</i>	50
What's Going On In England	52
Wheeling Steel Adds Towboat <i>Robert E. Reed</i>	53
Gas Turbine Progress	54
Univac Speeds Engineering Analysis Of Dampers And Turbochargers	55
Diesel Service Progress	56

EXECUTIVE OFFICES

816 N. La Cienega Blvd.
Los Angeles 46, Calif.

EDITORIAL OFFICES

1701 W. Wisconsin Ave.
Milwaukee 3, Wisc.

BUSINESS OFFICES

MILWAUKEE 3:
Bruce W. Wadman
1701 W. Wisconsin Ave.
Division 4-5333

LONDON E.C. 4:
G. L. Featherstonhaugh
St. Paul's Corner
Ludgate Hill

NEW YORK 17:
Jack Bain Company
545 Fifth Ave.
Murray Hill 2-3345

FIELD EDITORS

HIALEAH, FLA.:
Edwin Dennis
250 W. 50th St.
TUxedo 8-2188

LOS ANGELES 46:
James Joseph
8421 Melrose Ave.
OLive 3-4542

HOUSTON 18, TEXAS
Donald M. Taylor
1345 Chamboard Lane
OVerland 6-1127

PORT LAVACA, TEXAS:
Ruel McDaniel
P. O. Drawer 45

JEFFERSON CITY, MO.:
L. H. Houck
400 Linden Dr.
Phone: 6-2993

NORTHWOOD, MIDDX, ENGLAND:
B. W. Lansdowne
"Oaklands," Nicholas Way

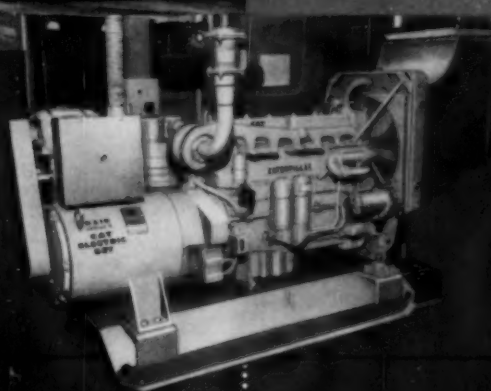
DETROIT 39, MICH.:
James W. Brown
15936 Kinloch Road
KENwood 2-1545

EVANSVILLE, IND.:
A. D. Berroughs
605 W. Maryland St.
HARRison 3-7313

FRONT COVER ILLUSTRATION

75 ft. auxiliary yacht
Kamalii powered with a
Mercedes-Benz 155 hp
turbocharged diesel. It
was designed by Philip
H. Rhodes and built by
Wilmington Boat
Works.



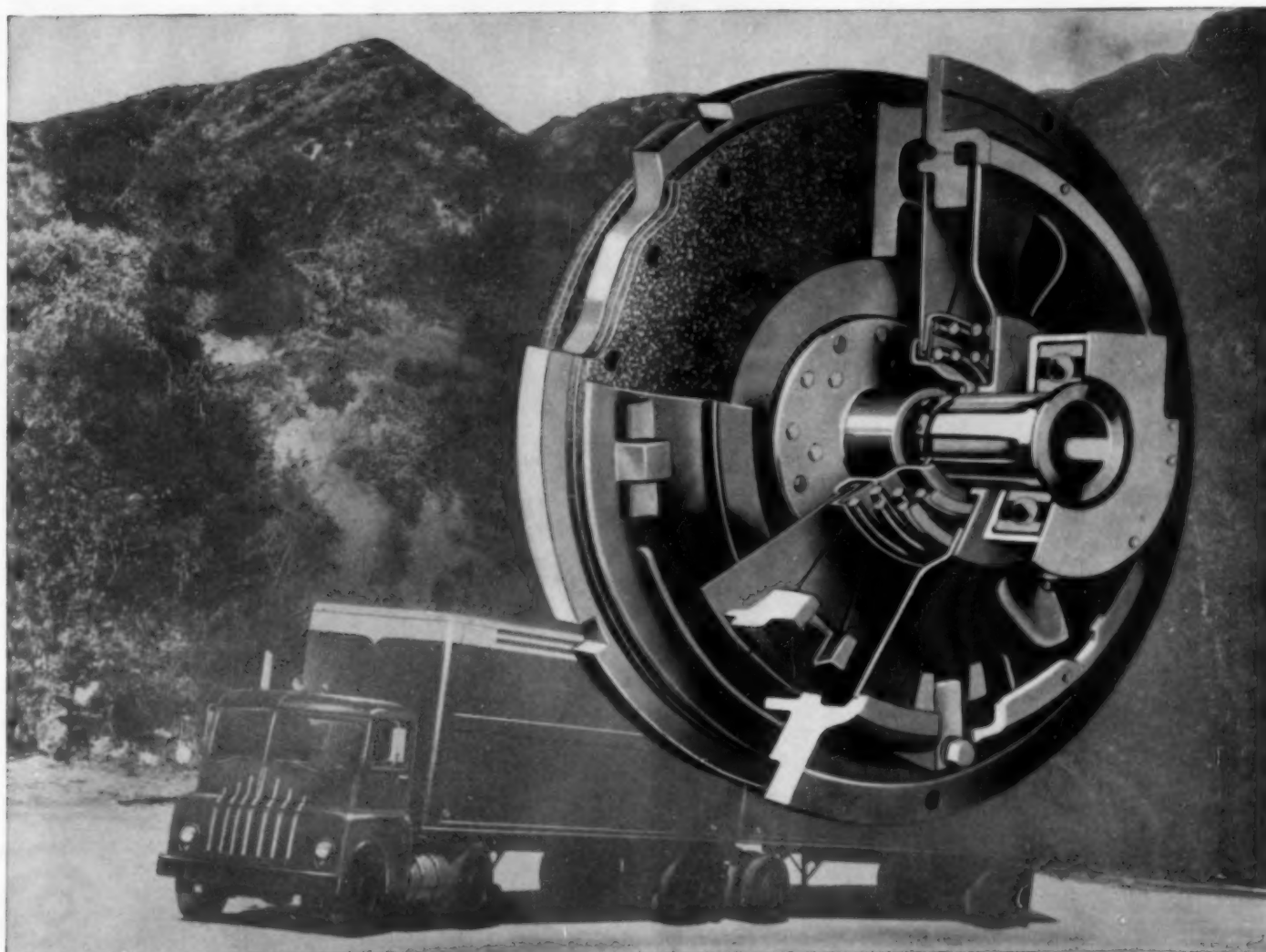


You find Schwitzer Turbos
where the world's work is done

SCHWITZER
C O R P O R A T I O N
INDIANAPOLIS, INDIANA

PRODUCTS WITH A NEW APPROACH

- Turbochargers ■ Superchargers ■ Fan Blades ■ Fan Drives
- Accessory Drives ■ Vibration Dampers ■ Air Starting Motors
- Water Pumps ■ Oil Pumps ■ Shaft Seals



Western Fleets Report:

150,000 to 200,000 trouble-free miles from Spicer H-D Clutches

Western terrain means rugged service for clutches. Yet, one West Coast operator says, "The only time we touch the Spicer Clutch is at the end of 200,000 miles. Then, we rebuild the engine and overhaul the clutch — whether it needs it or not."

Still another fleet owner states, "We don't even bother with preventive maintenance for our Spicer Clutches. They're absolutely trouble-free from one

overhaul period to another — or about 150,000 miles."

Make sure your clutches last at least as long as the engine by installing Spicer Heavy-Duty Clutches. They're available in a unitized assembly . . . including release bearing, bearing housing and yoke. Specify Spicer on your next job.

For further information or technical assistance contact the Dana Engineer.



DANA CORPORATION • Toledo 1, Ohio

DANA PRODUCTS Serve Many Fields:

AUTOMOTIVE: Transmissions, Universal Joints, Propeller Shafts, Axles, Power-Lok Differentials, Torque Converters, Gear Boxes, Power Take-Offs, Power Take-Off Joints, Clutches, Frames, Forgings, Stampings.
INDUSTRIAL VEHICLES AND EQUIPMENT: Transmissions, Universal Joints, Propeller Shafts, Axles, Gear Boxes, Clutches, Forgings, Stampings.
AVIATION: Universal Joints, Propeller Shafts, Axles, Gears, Forgings, Stampings.

Many of these products manufactured in Canada by Hayes Steel Products Limited, Merrifield, Ontario.

RAILROAD: Transmissions, Universal Joints, Propeller Shafts, Generator Drives, Rail Car Drives, Pressed Steel Parts, Traction Motor Drives, Forgings, Stampings.

AGRICULTURE: Universal Joints, Propeller Shafts, Axles, Power Take-Offs, Power Take-Off Joints, Clutches, Forgings, Stampings.

MARINE: Universal Joints, Propeller Shafts, Gear Boxes, Forgings, Stampings.

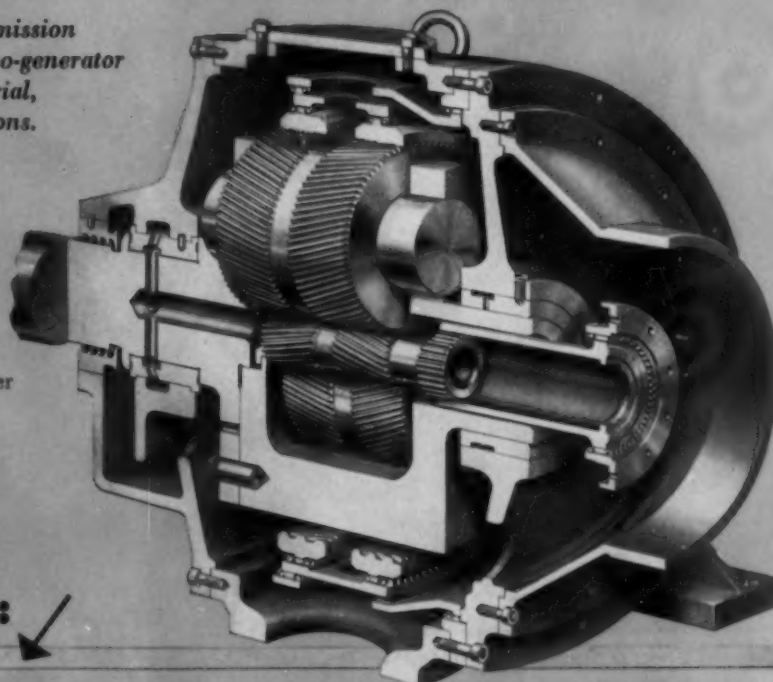
DE LAVAL-STOECKICHT PLANETARY GEAR

...for high speeds...high horsepower

**Proved in hundreds of installations abroad
totalling over 3,000,000 horsepower—now available in America!**

For all high torque power transmission applications such as pump turbo-generator and compressor drives in industrial, municipal and marine installations.

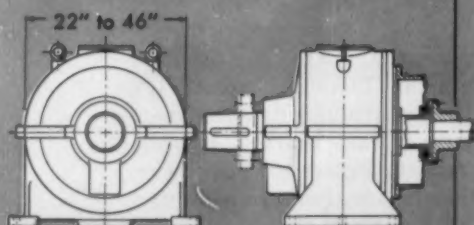
This cutaway view of the De Laval-Stoeckicht Planetary Gear shows how it provides flexibility for proper load distribution throughout the gear members. The thoroughly proved and tested design is completely reliable in transmitting high horsepower for high speed applications. • Highest efficiencies (98% or higher) ... no high speed bearings ... less friction losses.



Check These Advantages:

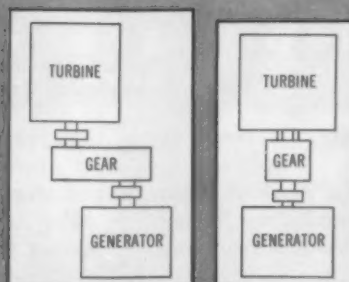
Small Size—Light Weight

Compact—low weight per hp. Sizes range from 22" to 46" in diameter, depending on horsepower requirements. Example: 5000 hp planetary unit weighs 1700 lbs. against 6000 lbs. for conventional gear.



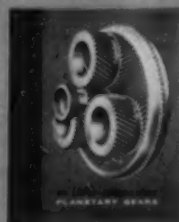
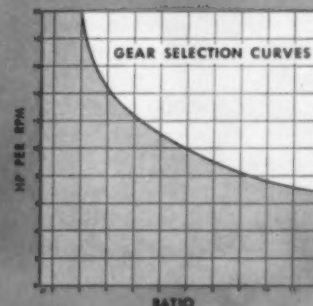
Convenient Arrangement

Co-axial or "in-line" arrangement of gear members takes up far less space than parallel axis gears of equivalent horsepower rating.



Wide Application

Capacity range shown in shaded area on chart below. For other applications, contact your De Laval Sales Engineer.



For further details,
write for Bulletin 2400.



DE LAVAL Steam Turbine Company

883 Nottingham Way, Trenton 2, New Jersey

DL431

AVAILABLE NOW!

1958 Diesel Engine Catalog

**New complete
information on
engines and
accessories**



look at the contents

- 1 **ENGINES**—All major manufacturers of diesel, dual fuel and gas engines are represented in multiple page sections. Text is supplemented with specifications, power curves, photographs and sectional views.
- 2 **TURBOCHARGERS and SUPERCHARGERS**—This section of manufacturers is detailed and fully illustrated to give complete information on this increasingly important phase of the industry.
- 3 **TRANSMISSIONS**—The latest information on torque converters, fluid drives, and other modern means of transmitting power are fully described and illustrated in this section.
- 4 **ACCESSORY EQUIPMENT**—Recent developments in fuel injection systems, governors, and other key accessory units are detailed and illustrated fully in this section.
- 5 **MARKET PLACE**—A convenient, time-saving listing of sources from which you can obtain the multitude of items and services needed by the fast growing Diesel Industry.
- 6 **ADVERTISING**—Leading manufacturers of engines, accessories, and services bring out the important features of their products in attractive, easy to read advertisements to further enhance the reference value of the CATALOG.

VOLUME 23 of the DIESEL ENGINE CATALOG is now available and is the biggest, most complete edition published to date. It has been completely revised and rewritten with many new or extensively changed sections graphically describing new engines and accessories. If you design, purchase, sell, operate or service diesel, dual fuel or gas engines, this new Catalog is a practical necessity. Recognized as the "Bible of the Industry," the 1958 DIESEL ENGINE CATALOG is a big 400-page book. With the same size and wide-open format as in previous editions, reference is simple and quick. Each section is fully illustrated with pictures, power curves, specification charts and sectional views. Equally important, the text presents a full description of the products and their fields of application.

**READY TO MAIL NOW
order today!**



This brand new edition of the 1958 DIESEL ENGINE CATALOG is now available.

**Order your copy of VOLUME 23 NOW!
Still only \$10.00 per copy.**

DIESEL ENGINE CATALOG

816 N. LaCienega Blvd.
Los Angeles 46, Calif.

Enter our order for _____ copy(s) of Volume 23, DIESEL ENGINE CATALOG.

Check is enclosed ☐ Bill us ☐

\$10.00 per copy (plus state sales tax when delivered in California). When ordering from Sterling Areas, remit £4:0:0 to DIESEL PROGRESS, St. Paul's Corner, Ludgate Hill, London E.C.4.

Name _____ Position _____

Company _____

Business Classification _____

Address _____

City _____ Zone _____ State _____

Nothing gets by

Automatic end-point testing

device developed by

Standard Oil research men

makes certain of the

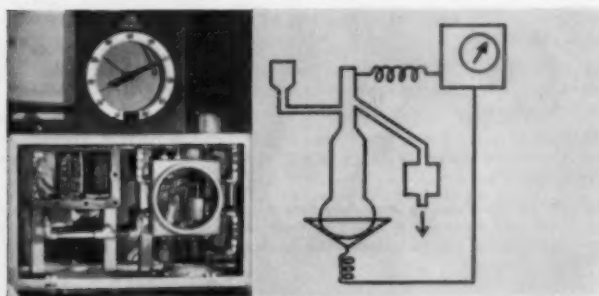
uniform quality of gasoline and

diesel fuel delivered to you.

Scientists at Standard Oil never stop in their drive to improve and then improve again the uniform quality of the petroleum products that bear the Standard Oil trade-mark. These engineering research scientists have now created wholly new instruments for performing near continuous physical analysis *automatically*.

One such instrument automatically performs the physical analysis that determines end-point. Using it, refineries maintain a continuous inspection of the temperature at which diesel fuels are completely distilled. To you, this means that Standard is able to maintain a constant control over the uniformity and high quality of the fuels you use to power your diesel engines. It also means that Standard Oil power-producing petroleum products, with their constantly controlled end-point, burn uniformly, give you uniform high performance.

This is part of the research pay-out, the "something more" research builds into the products you buy from Standard. This is your return from Standard's investment in research. And now there are 48 district offices in the 15 Midwest and Rocky Mountain states to serve you. Call the one nearest you. **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

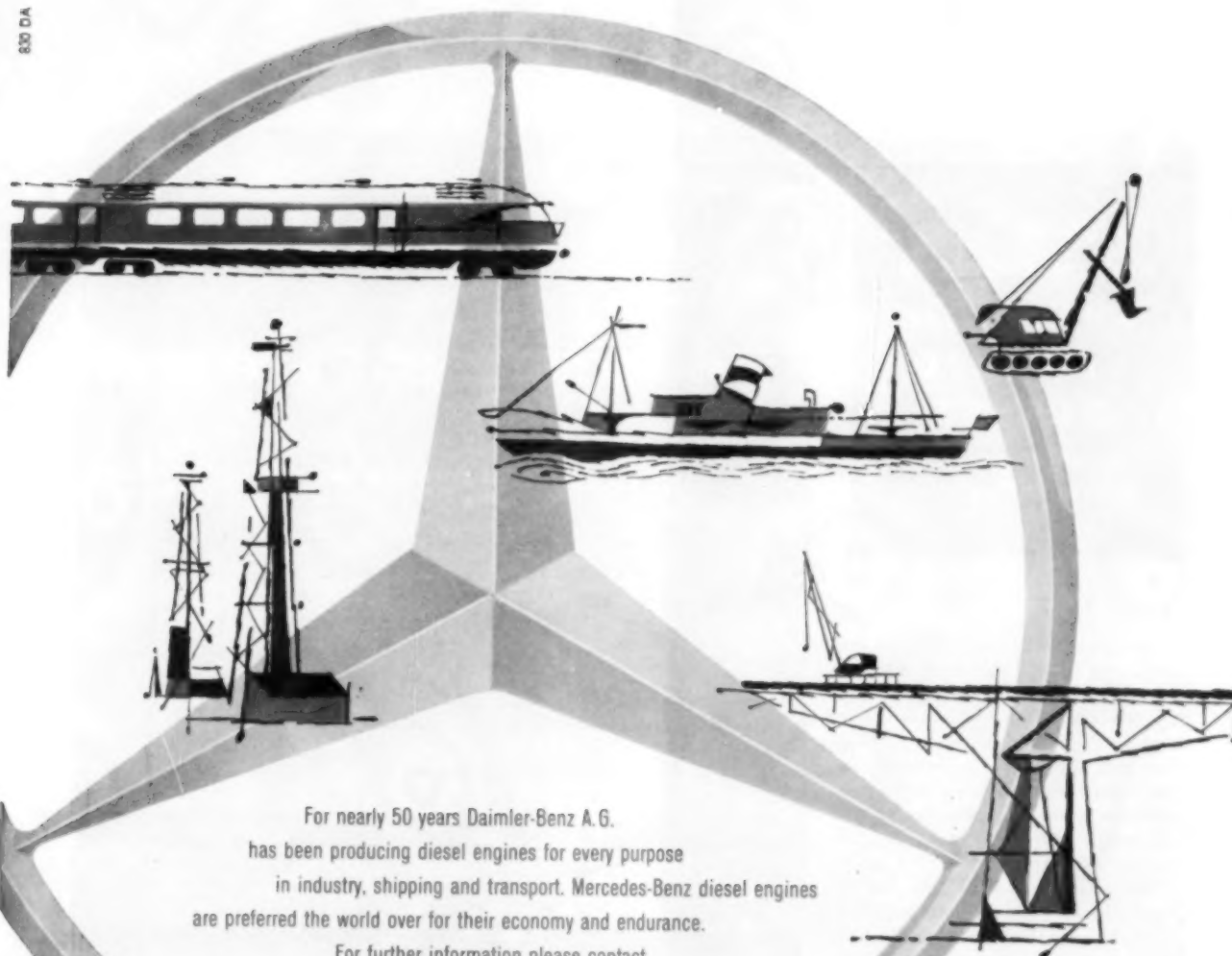


Automatic end-point tester works this way. A small sample is placed in an electrically heated flask. The temperature is measured and recorded during a heating cycle when distillation is accomplished. Distillate is condensed and drained, the flask temperature is lowered by introduction of the next sample, and the apparatus is ready for another test.

You expect more from

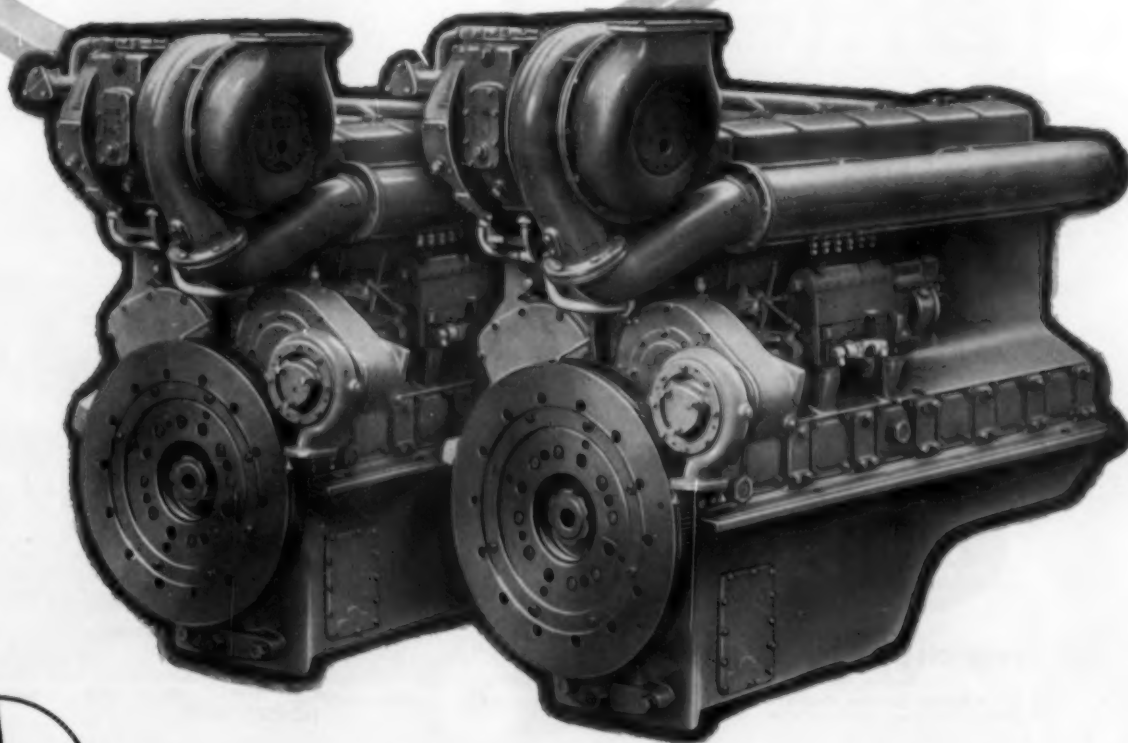


and get it!



For nearly 50 years Daimler-Benz A.G.
has been producing diesel engines for every purpose
in industry, shipping and transport. Mercedes-Benz diesel engines
are preferred the world over for their economy and endurance.

For further information please contact
UTICA Div., Curtiss Wright Corp., Utica, Mich.



MERCEDES-BENZ

Unbiased
recommendations

FRICITION or FLUID DRIVES

Manual, Air or
Hydraulic Operation

To couple an engine or motor to the load, one of the following may be used: a friction clutch, fluid coupling, single-stage torque converter or a three-stage torque converter. Twin Disc can furnish you an unbiased recommendation as to which is the best selection under any given set of circumstances—for Twin Disc offers all four types of drives.

No other company builds the diversified line manufactured by Twin Disc. Industrial clutches are offered from 2½ to 36 inches in diameter. Designed to run wet (in oil) or dry, these clutches can be actuated mechanically, hydraulically or with air.

When a fluid drive is necessary or preferable, Twin Disc can recommend just the right one. Twin Disc offers fluid couplings with 1:1 torque ratio . . . single-stage torque converters with up to 3:1 torque multiplication . . . or three-stage torque converters with torque ratios up to 6:1. No other manufacturer builds both three-stage and single-stage torque converters . . . no other manufacturer can offer all three types of industrial fluid drives!

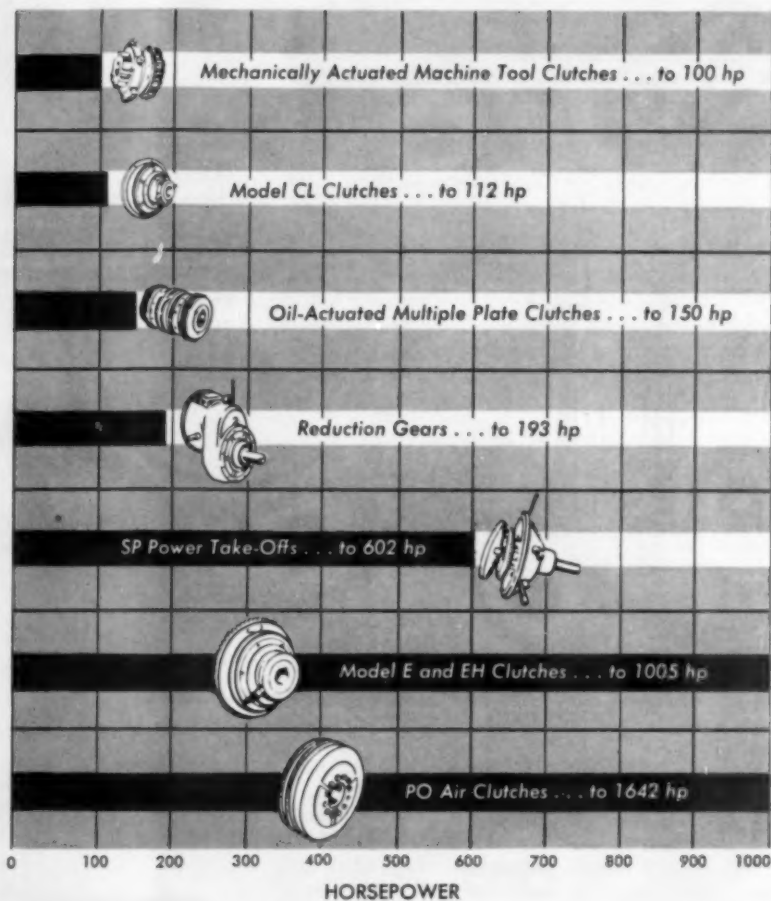
Whatever drive—friction or fluid—is most appropriate for your own particular application, you'll find it in the Twin Disc line. Write for complete information.



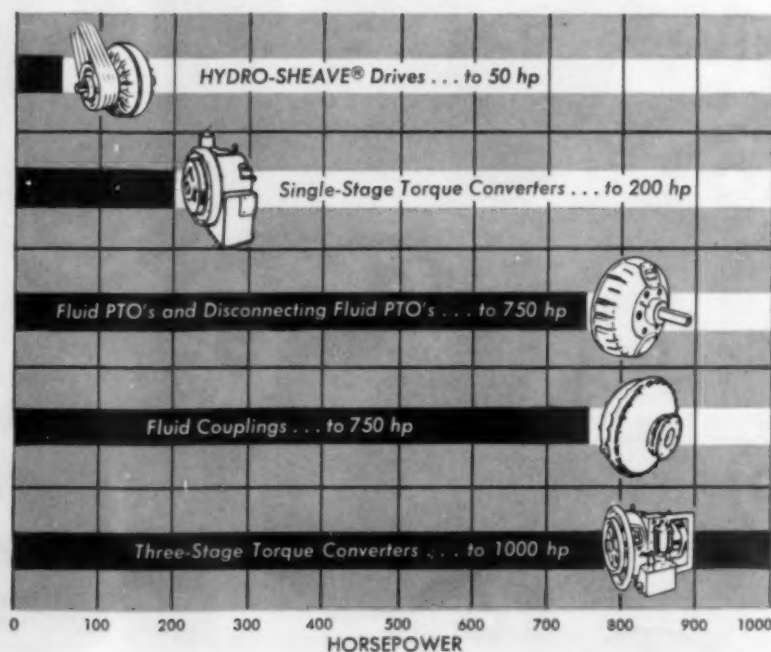
TWIN DISC CLUTCH COMPANY

Racine, Wisconsin
Hydraulic Division, Rockford, Illinois

FRICITION DRIVES



FLUID DRIVES



Record Speeds for Greater Profits

50 per cent faster cruising speeds recorded by
standard boat using Solar gas turbines!



Boat built by Sewart Seacraft, Berwick, La.

TWO 500 HP SOLAR GAS TURBINE engines produce cruising speeds of better than 35 mph in this commercial workboat—*50 per cent faster than the same boat using diesel power!* By reducing the time required for commercial workboat operation, the 55-foot turbine-powered craft can save thousands of dollars daily in some applications. It signals a profitable new era in marine propulsion.

Weight of the complete 1000 hp Solar gas turbine power package is

4400 lb—1/6th the weight of marine diesels of equivalent power. It accelerates from dead stop to 35 mph in 12 seconds—while the same boat with diesel power requires more than 1 minute to reach 22 mph. And revolutionary Solar turbines offer other significant advantages including absolutely no vibration, easy maintenance, low noise levels and ability to burn a wide variety of fuels. Find out how these remarkable engines can step up your com-

mercial boat operation. Write to Dept. F-77, Solar Aircraft Company, San Diego 12, California. We'll include a free gas turbine brochure.

SOLAR
AIRCRAFT COMPANY

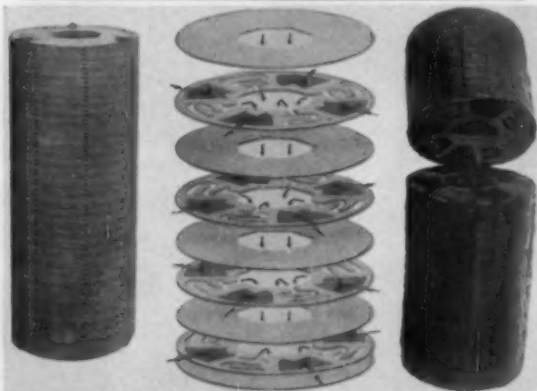


SAN DIEGO
DES MOINES

New **HILCO**[®] **FULL FLOW FILTERS**

with these features:

- | | |
|---------------------------------|-------------------------------------|
| ✓ High flow rates | ✓ In-out pressure gauges |
| ✓ Low pressure drop | ✓ Quick action cover lifter |
| ✓ Choice of filter cartridges | ✓ 100 psi standard design pressure |
| ✓ Large dirt storage area | Higher pressures upon specification |
| ✓ All steel welded construction | |
| ✓ Swing bolt cover construction | |



HILCO FILTER CARTRIDGE TYPE FW-718 COMBINATION EXTENDED SURFACE AND DEPTH MICRO FILTRATION



HILCO FILTER CARTRIDGE TYPE PL-718 EXTENDED SURFACE FOR EXTREMELY HIGH FLOW RATES



"F" Series
HILCO
HYFLOW
OIL
FILTER

HILCO Full Flow Filters Available in Capacities Up to 2000 GPM and Micro Filtration at That . . . Removing Particles 5 Microns and Smaller

• Write to the
PIONEERS
of Micro Full-Flow
FILTRATION



THE HILLIARD Corporation

122 W. FOURTH STREET

ELMIRA, NEW YORK

IN CANADA: Upton-Braden-James, Ltd.: 890 Yonge St., Toronto • 8760 Verville St., Montreal

ENGINEERING

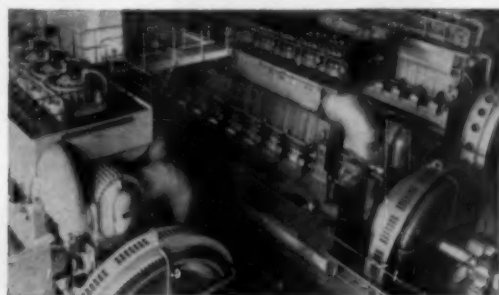
NEWS YOU CAN USE ABOUT ENGINE AND COMPRESSOR PERFORMANCE

BIG MEAL FOR CORROSION!



INSIST ON CORROSION-RESISTANT COOK PACKING GLANDS

Even in the very toughest service, there's no excuse for rust and corrosion eating away your packing glands. In 999 cases out of 1000, packing glands of Cook stainless steel or *Ni-Resist* type iron will solve the problem. For the remaining 1 problem in 1000, Cook can probably design an answer. That's because C. Lee Cook pioneered in the field of metallic packings — knows more about their specific, on-the-job use than anyone else. Insist on genuine C. Lee Cook parts and service.



COOK RINGS IN DIESEL SERVICE 3 YEARS—STILL GOING STRONG

Here's a report on Cook rings at Rockville Centre, N. Y. municipal power plant. It's the result of a cylinder inspection on their No. 8 diesel unit after nearly three years of continuous operation.

"While several rings were replaced in Grooves 1 and 2, Cook rings in Grooves 3, 4, 5 and 6 could run for another 10,000 hours! And cylinders averaged less than .001" maximum wear per 1000 hours of operation."

"Piston Rings and Engine Power"

SEND FOR
FREE
8-PAGE
BOOKLET!



Write for your free copy of this technical article on the importance of keeping piston ring faces to the wall...an informative study of the effects of piston ring problems on the various types of engines and their operation. Write C. Lee Cook Company, 940 South 8th Street, Louisville 3, Kentucky.

**C. LEE
COOK**
COMPANY
Division of Dover Corporation
Rings and Packings Since 1888





To save you time, we've got it in rhyme!



The



of electric

generator construction

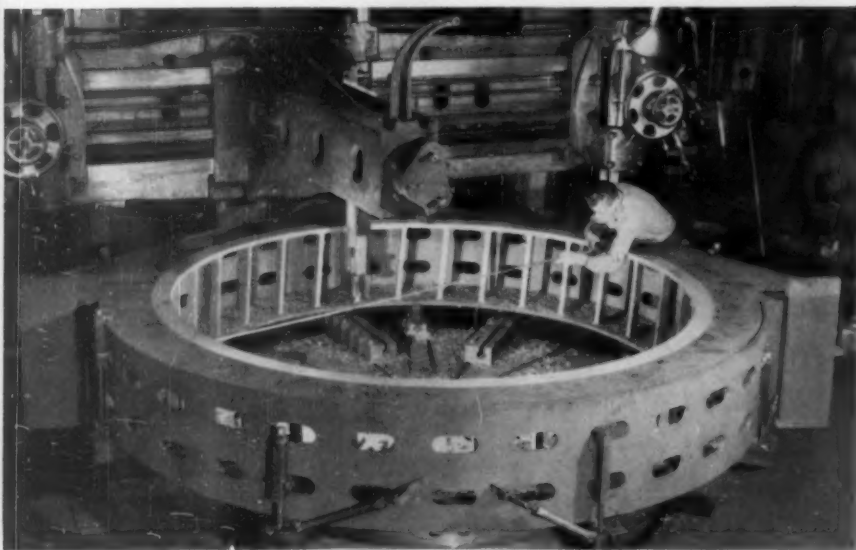
Here's an action picture sequence of a big E-M Custom-Built Synchronous Generator in construction. Step by step, you can observe the meticulous care given to every construction detail by E-M engineers and craftsmen. The little rhymes will call your attention to the key points in each picture.

This particular E-M Generator, built for the Central Kansas Electric Coop., Inc., Great Bend, Kansas, is rated at 4250 kva, 2400/4160 volts, 257 rpm. Your plant's generator requirements may not be this sizeable, but it is a point of pride at E-M that the same careful attention is given to *every* Generator, large or small, which bears the E-M nameplate.

a

A's for All-welded, this frame for long duty,
Unique in its strength, a self-contained beauty.
All welding is done before other work starts,
So it's free from distortion as we add other parts.

ELECTRIC MACHINERY MFG. COMPANY
MINNEAPOLIS 13, MINNESOTA



b

Precise Boring is next on this tough stator frame...
The air gap stays uniform, always the same.
The resultant gain is a point to remember—
High quality power from Jan. through December.



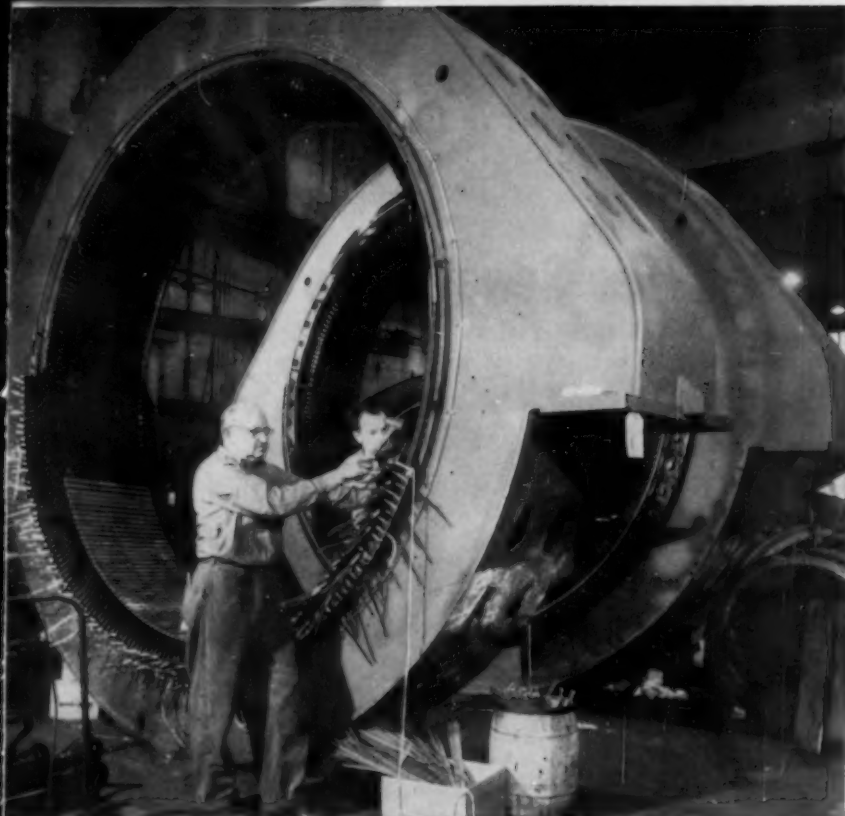
c

Care in Construction means no through-bolts here;
Unified components are strikingly clear.
And dovetailed keys support each lamination...
This is convincing strength demonstration!



d

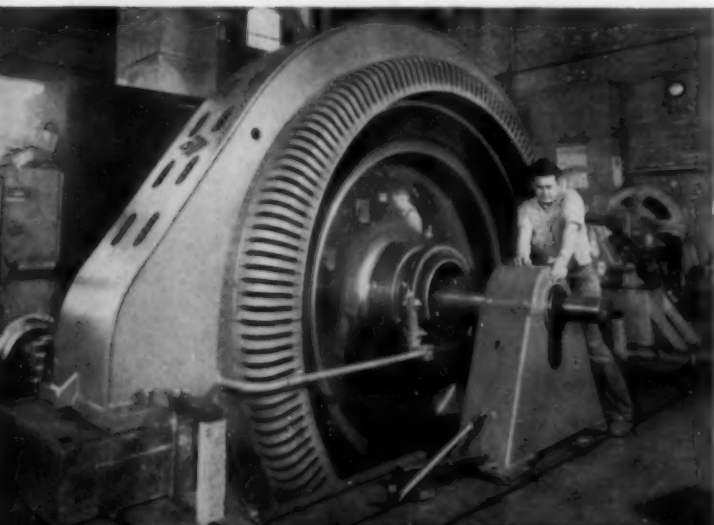
Diligence you'll find in the lamination stacking,
Permanently in place... what meticulous packing!
Core slots are "skewed" with strict adherence
To lowest possible 'phone interference.



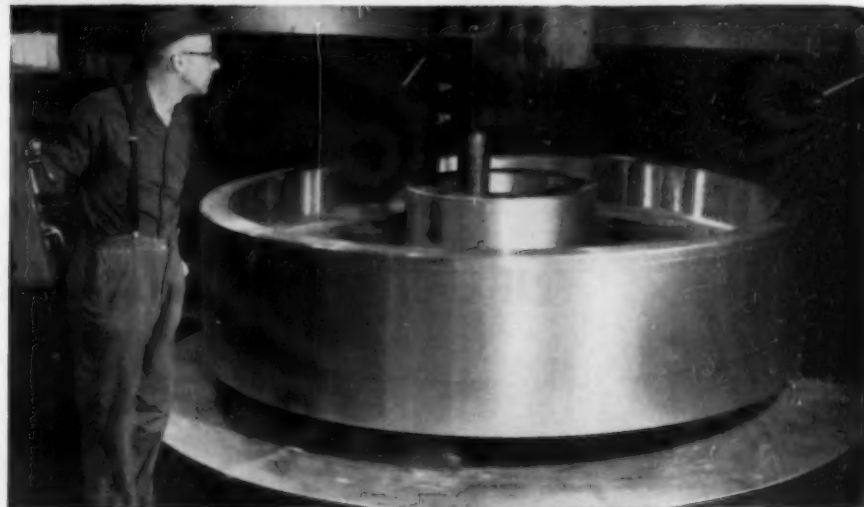
e The winding Excels, like the lashing of coil ends . . . No wobbles, no weaving, no movements, no bends. Special lashing makes coils resist urges To distort from lightning or switching surges.



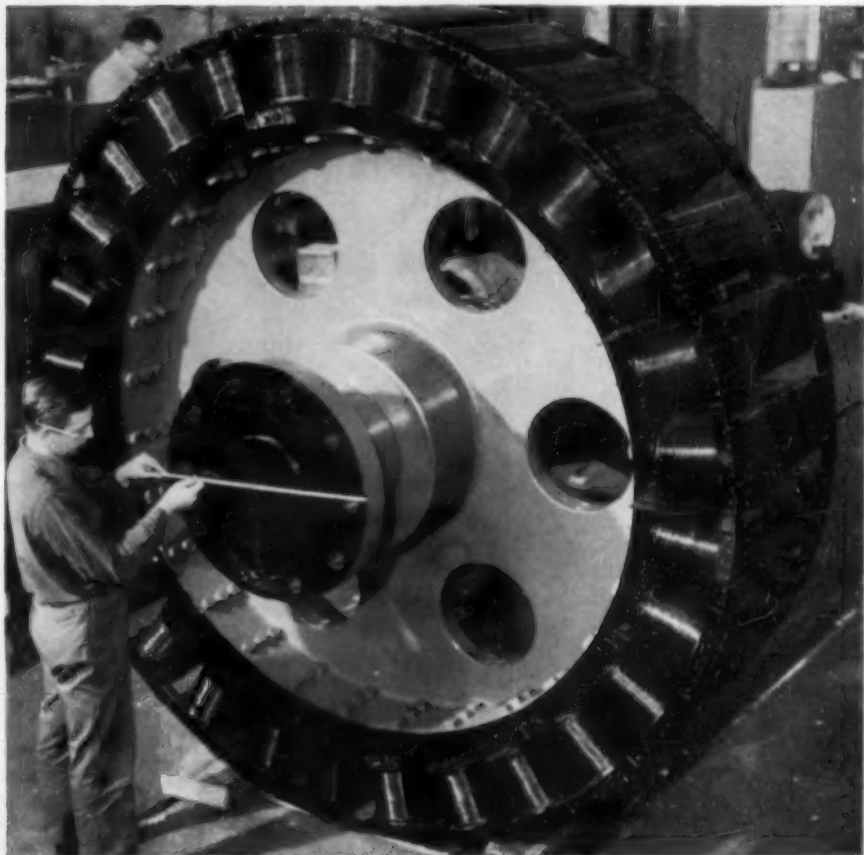
g Generatorly speaking, even after crystal-gazing We decided we feature the best method of brazing. It means better damping, and it's no small sensation To notice improvement in generator operation.



i Inspection is thorough, when we've done all the rest, For each E-M machine stands a rigorous test. When it's installed in your plant, you're assured it can take it . . . It's bound to be rugged, for it had experts to make it!



f F is for Flywheel Effect, which increases first-rate With a cast rotor spider, a true heavy-weight. And . . . so important in each power station . . . You get much better parallel operation.



h H is for Handsome . . . the rotor complete. It's a clean, shining beauty that just can't be beat! Every part is just right . . . every part will stay tight; Good news for the user . . . good power . . . good light!

We suggest, with full confidence, that you contact your nearest E-M sales engineer when plant modernization or new plant planning comes up. He knows electric power generating equipment from A to Z, and can help you materially in getting dependability and extra value in equipment.

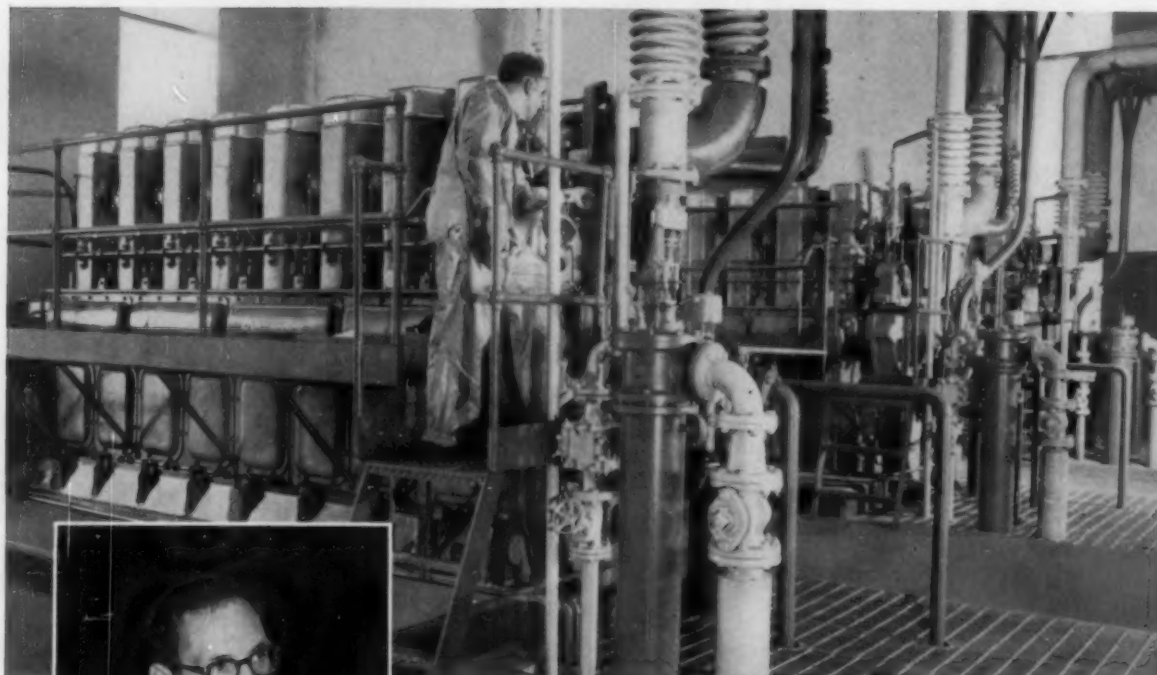
Also—be sure to write the E-M factory for your free copy of Publication No. 196, "Your E-M Guide to Profitable Installations of Modern Generators." Electric Machinery Mfg. Company, Minneapolis 13, Minnesota.

E-M

2200-TPA-2198

SPECIALISTS IN *Custom-Built* GENERATORS

Enterprise Engines Run 90% on Free Sewage Gas



Three 625 HP Enterprise Dual Fuel engines at San Jose, Calif. handle the complete power load for all electrical and pumping requirements of this sewage plant.

"Trouble-free and maintenance-free, with very reasonable manpower requirements."

Frank M. Belick

Supt., San Jose, Calif., Sewage Treatment Plant

"We're extremely pleased with the record of efficiency and economy experienced to date with our three Enterprise Engines. They have operated trouble-free and maintenance-free, fitting in exceptionally well with our treatment plant requirements.

"By operating on methane, the sludge gas by-product of sewage treatment, our fuel costs have remained at a minimum. In addition, the Enterprise Dual Fuel 'Select-O-Matic'® feature has given us the flexibility we need when sludge gas production becomes erratic. On either gas or oil the engines respond well to changes in power demands. All in all, these engines provide us the dependable, continuous operation we need with very reasonable manpower requirements."

This and other model sewage plants in such cities as New York, East Boston, Mass., and San Diego, Calif., attest to the fact that complete dependability and economy of municipal operations start with Enterprise Engines.

Engines of Every Type and Size for Every Municipal Need

Enterprise specializes in engines for stationary and portable electric power generation, flood and water pumping systems, and sewage plant power. Versatile fueling is available in diesel, dual fuel and spark ignited gas engines. Models range from 73 to 7703 HP. Call in the Enterprise sales engineer in your area, or contact factory direct for information or help with your plans.

ENTERPRISE
dependable **ENGINES**

Over a million horsepower at work the world over!

ENTERPRISE ENGINE & MACHINERY CO.
Subsidiary of General Metals Corporation
18th and Florida Streets, San Francisco 10, California
Export Department, San Francisco



Boston • Chicago • Des Moines • Fort Worth • Huntington • Jacksonville • Kansas City • Los Angeles
New Orleans • New York • Pittsburgh • San Diego • Seattle • St. Louis • Washington, D.C.

Another new product from
Rockwell-Standard:



HYDRA-DRIVES® POWER SHIFT TRANSMISSIONS

A torque converter...and 4 speed transmission in one compact package!

Hydra-Drives Power Shift Transmissions put more power to work...smoothly...efficiently...economically. Proved in hundreds of vehicles for three years, these units assure top work output of heavy-duty equipment. Engine lugging and heavy shock loads are eliminated. A 3 to 1 torque multiplication makes starting fast and effortless—even with heaviest loads.

Simple to operate, too, a flip of the operator's lever accomplishes power shifts within each range and without any interruption of the power flow. Automatic features of the converter and ease of power shifting simplifies operator training and lengthens vehicle life.

With four speeds forward and reverse, the Hydra-Drives Power Shift Transmission is ideally suited for vehicles which must travel in both directions during a normal work cycle. Rated at 550 ft. lbs. input torque, they can be used with a wide range of internal combustion engines up to 250 H. P.

The Transmission and Axle Division of Rockwell-Standard specializes in drive components only, and does not compete with manufacturers of end products. Take advantage of 50 years' experience in the manufacturing of power transmission components, specify Rockwell-Standard.



©1958, R-S Corp.

Products of **ROCKWELL-STANDARD** Corporation

CUT HAUL COSTS - INCREASE PROFITS

When all the facts are in, fleet owners just naturally turn to Mercedes-Benz diesels . . . Fast, over-the-road hauling is the business of these tough, smokeless, odorless world famous engines, and quality, performance and economy is the business of the fleet owner . . . With a Mercedes-Benz under the hood or riding the top as power for refrigeration, payloads hit the pay-off point . . . Their high horsepower to low weight ratio gives you an outstanding, unmatched power package.

MERCEDES-BENZ

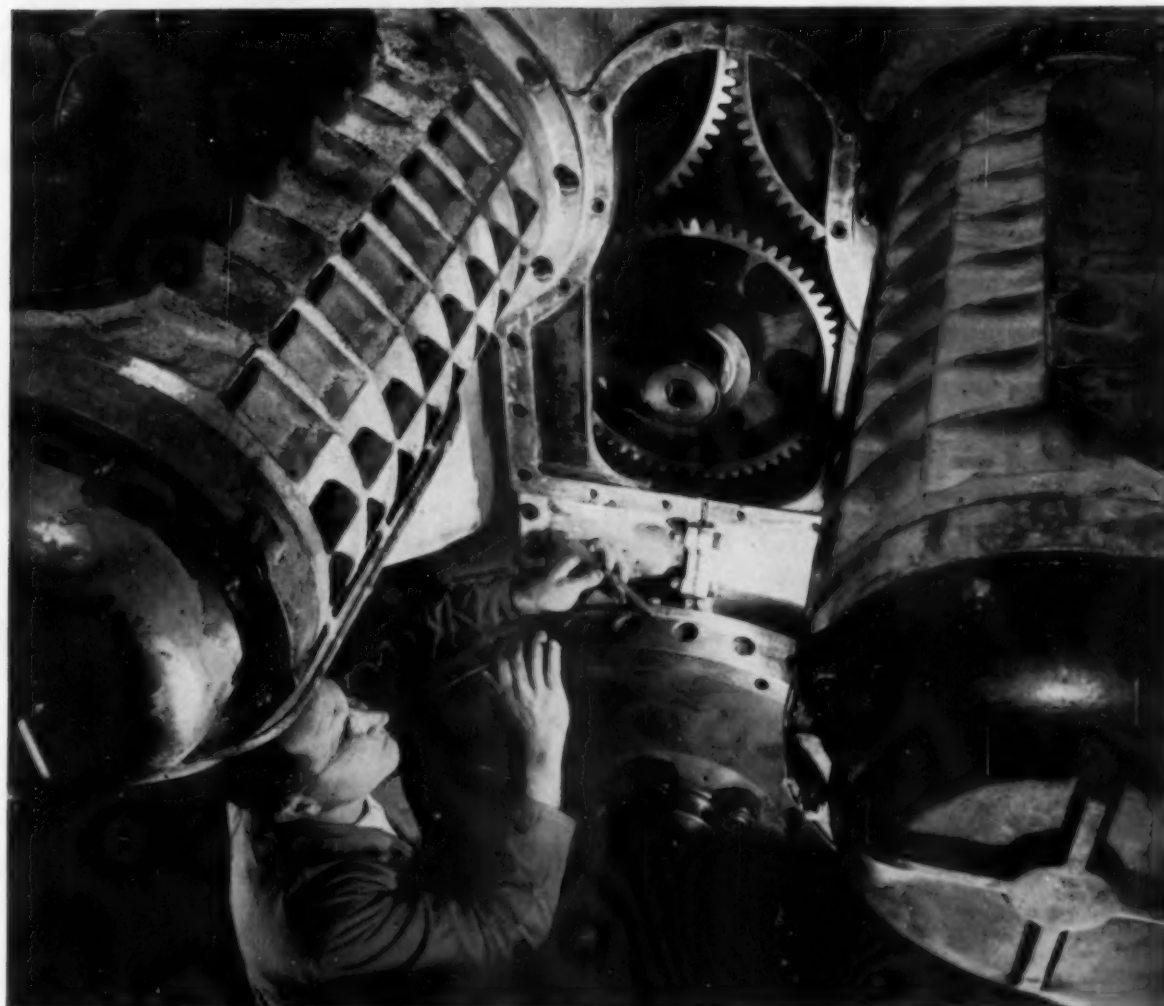
Diesel Engines



ENGINEER'S FIELD REPORT

PRODUCT RPM DELO OIL RR

FIRM NORTHERN PACIFIC RAILWAY
South Tacoma, Wash.



RR diesel gears show only $\frac{1}{2}^\circ$ wear in $2\frac{1}{2}$ million miles

Timing gears on this Northern Pacific GMC-diesel locomotive engine, lubricated with RPM DELO Oil RR, recently completed $2\frac{1}{2}$ million miles of severe freight service without repairs or adjustment. NP's South Tacoma Shop Foreman, A. R. Genin (above), indicates degree marks on engine flywheel, used to gauge gear wear. Tolerance between gear teeth shows variance of just $\frac{1}{4}^\circ$ from original setting. Mr. Genin says, "We consider this low rate of wear remarkable for heavy-duty freight operation. It is typical of our experience during the 12 years we have used RPM DELO Oil in all our locomotive diesels." Engines are 1350 h.p. 16-567 series.

Why RPM DELO Oil RR reduces wear, corrosion



- Oil stays on engine parts—hot or cold, running or idle • Anti-oxidant resists lacquer formation • Detergent keeps parts clean • Special compounds prevent corrosion of bearing metals • Inhibitor resists foaming.



For More Information about RPM DELO Oils or other petroleum products of any kind, or the name and address of your nearest distributor, write or call any of the companies listed below.

TRADEMARK "RPM DELO" AND DESIGN REG. U. S. PAT. OFF.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20
THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey

STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA COMPANY, Denver 1, Colorado



THIS MUCH DIRT CAN RUIN A DIESEL ENGINE



THIS PUROLATOR FILTER



STOPPED THIS MUCH DIRT

Diesels can't escape abrasive dirt . . . and it takes about 8 ounces of it to ruin an engine.

The 18 pounds of dirt shown above were stopped by a Purolator heavy duty dry type air filter on a rock drilling rig in 940 hours of operation—with no servicing of the filter required. The 6 cylinder, 2 cycle engine and the 750 CFM compressor used on the job were fully

protected through the toughest operating conditions. 18 pounds of dirt were stopped . . . none got through the filter.

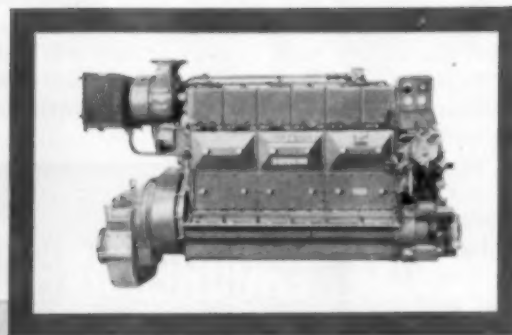
There's a Purolator dry type air filter designed to meet the specific requirements of your operation. Write today for full information. If you have a particularly tough problem, describe it . . . Purolator has the solution.

Filtration For Every Known Fluid

PUROLATOR
PRODUCTS, INC.

RAHWAY, NEW JERSEY AND TORONTO, ONTARIO, CANADA

Repowered by **WHITE'S** Superior Diesels



"Agnes S" now operates more than 85% of the time around-the-clock!

During the 10-month period after she was repowered with two of White's Superior 40-MSX-6 Marine Diesels, the towboat *Agnes S* was in operation more than 85% of the total time around-the-clock! Most important, the owners, Central Soya Company of Fort Wayne, Indiana are consistently achieving their desired transport goal—12 million ton-miles per month!

High-quality, precision-built Superiors enable the *Agnes S* to push 9 loaded grain barges, totalling over 12,000 tons per tow, between Paducah, Kentucky and Chattanooga, Tennessee.

Each of the 6-cylinder diesels is rated 540 BHP continuous at 900 RPM. Superior's conservative horsepower ratings result in generous reserve power. Not only does the *Agnes S* accelerate faster and handle easier than before, but she has on occasion pushed 11 loaded barges over her Tennessee River route. Originally launched in 1951, the towboat was rebuilt in 1956. When it came to power, the owners wanted more horsepower and greater dependability. They wisely chose two heavy-duty, trouble-free White Superior Diesels to replace the three former engines. Hundreds of owners of towboats, tugs, dredges, fishing vessels and other workboats specify White's Superiors in the range of 225 to 2150 HP for highest dependability and lowest operating cost.

GET COMPLETE INFORMATION AT OFFICES LISTED BELOW



White Diesel

WHITE DIESEL ENGINE DIVISION
THE WHITE MOTOR COMPANY Plant and General Offices: Springfield, O.

SALES AND SERVICE POINTS: Ketchikan, Alaska • San Francisco, Terminal Island, California • Denver, Colorado • Washington, D.C. • Clearwater, Florida • Chicago, Illinois • Wichita, Kansas • New Orleans, Louisiana • Boston, Mass. • Baltimore, Md. • Park Rapids, Minnesota • Webster Groves, Missouri • Callaway, Nebraska • New York, N.Y. • Tulsa, Okla. • Portland, Astoria, Ore. • Hickory, Pa. • Ft. Worth, Houston, Texas • Seattle, Wash. • Calgary, Alberta • Vancouver, B.C. • Halifax, Nova Scotia

New Marketing Vice President

R. R. Newquist, president of Roots-Connorsville Blower Division of Dresser Industries, Inc., today announced the appointment of W. W. "Win" Harris as vice president-marketing effective immediately. Mr. Harris will have responsibility for the marketing of Roots-Connorsville equipment throughout the United States and Canada. Resigning from General Electric Co. to assume his new assignment, Harris will move his family from Texas to Indiana. A graduate of the University of Oklahoma, Harris served seven years in the Air Force as pilot, navigator and bombardier. His more than 11 years of marketing management experience has ranged from serving capital and consumer industries to Department of Defense requirements for highly engineered and technical equipment. Mr. Harris will in the near future visit Roots-Connorsville sales offices and customers in the major cities of the United States and Canada to evaluate new markets for R-C products and study means whereby customer service might be made more effective.

Con Diesel Promotes J. A. Grimes

Consolidated Diesel Electric Corp. has appointed John A. Grimes to the post of General Manager, Test Equipment Division, it was announced today by Gerald Rosenberg, group vice president in charge of the company's test, aircraft and power equipment divisions. Mr. Grimes' association with Con Diesel extends over the past three years during which he has been administrative engineer and assistant to the president. Prior to joining the company, he was for 17 years a civilian employee of the U.S. Air Force. He served in various positions with the USAF, the most recent having been that of chief, ground equipment branch, Wright Air Development Center, Dayton, Ohio. He is a mechanical engineering graduate of the University of Rhode Island, class of 1937. Con Diesel's Test Equipment Division is engaged in production of hydraulic, fuel, electrical, pneumatic and mechanical testing equipment for functional check-out of systems and components of missiles, aircraft, aircraft engines and automotive accessories.

Air-operated Valve Line

A new line of air-operated valves has been developed and is now in production by the High Pressure Equipment Co., Inc., 1222 Linden Street, Erie, Pa. The design of this new air-operated valve is for on-and-off service in line operation. With 6 to 30 lbs of instrument air the valve operation delivers up

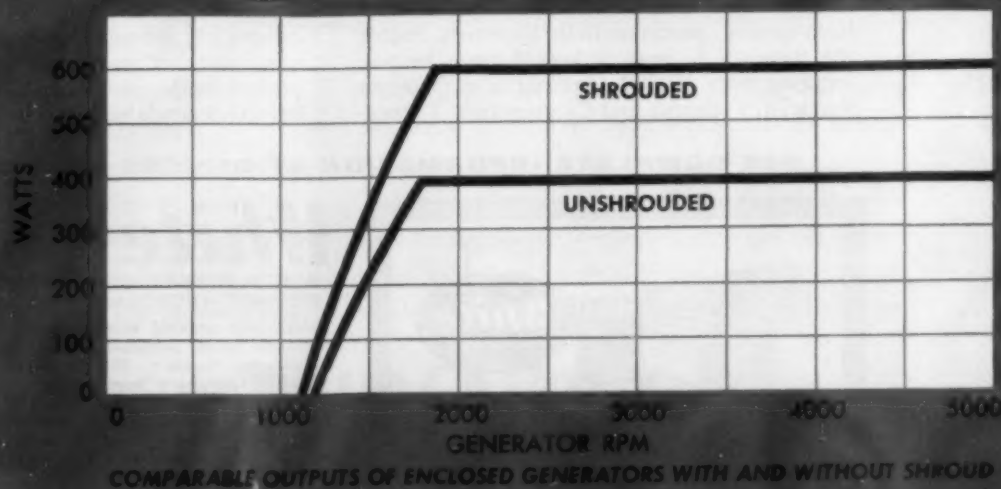
to #1500 force. Since at 30,000 psi the stem must pierce over #900 pressure to close, the air control aids in the ease and accuracy of the valve operation. The valve line is manufactured to operate three ways: (1) air to open—spring to close (2) spring to open—air to close (3) air to open—air to close. It is available with manual over-ride safety emergency feature and can be specified for

high temperatures. A self-contained mounting bracket is integral with valve and permits easy installation. This air-operated valve line is produced in 316 and 410 stainless steel body material, and the replaceable seats and stems feature is especially advantageous where a corrosion or erosion condition might exist. It is also offered with adjustable micro-switches to determine remote in-

dication of the valve position. The valves are identified as the Remarco line and include tube sizes of 1/8 in., 1/4 in., 3/8 in., 1/2 in., 5/8 in. and standard pipe sizes in pressure ranges of 10, 30, and 60 psi. The valve design will accommodate the standard HIP floating O ring packing for ease of operation and inexpensive replacement.

ITS NEW

PROGRESSIVE ENGINEERING MAKES THE DIFFERENCE



Allison Receives Large Contract

Allison will overhaul and modernize 1000 older type CD-850 transmissions, bringing them up-to-date with models now in production under a \$4,674,528 contract with the Cincinnati Ordnance District, it was announced today by Keith H. Hoffman, manager of transmissions operations of the Allison Di-

vision of General Motors. "This contract will represent additional work for Allison because this is the first overhaul we have done for the Army Ordnance Corps," Hoffman declared. "It also represents a substantial cost-saving for ordnance because these transmissions can be modernized and continued in service at a fraction of the cost of new transmissions." Transmissions, now lo-

cated in various Ordnance Depots, will be returned to Allison starting within the next 60 days and first overhauled transmissions are scheduled to be delivered back to Ordnance in October. Deliveries will continue for approximately one year and it is expected that the work can be accomplished within present Allison total employment. Three types of CD-850 transmissions which

have been in service in several different Ordnance vehicles will be modified into a single type for complete interchangeability among the various vehicles using CD-850 transmissions. By incorporating improvements made through five years of engineering and service experience, the transmissions will also gain increased service life.

NEW DELCO-REMY TOTALLY ENCLOSED GENERATORS OFFER 50% MORE OUTPUT WITHOUT INCREASE IN SIZE

Delco-Remy's new, totally enclosed shrouded generators offer up to 50% more output than former enclosed models of this size. They are especially designed for construction vehicles and off-the-road equipment subject to extremes of dust and moisture, or corrosive materials. Because they are totally enclosed, they are *splash-proof* and *dust-proof*.

Key feature of the new units is a high-efficiency fan mounted at the commutator end in a compact, formed steel shroud. The shroud-controlled air blast travels closely along the generator frame where it produces rapid and effective cooling . . . makes possible up to 50% more output, without the added cost of increased frame size.

For every kind of heavy-duty operation, Delco-Remy generators provide greater power and reliability with long life. Be sure to specify Delco-Remy shrouded generators—where required—for your new equipment. Readily available in 6-, 12-, and 24-volt models for replacement application on present equipment through the United Motors System.

DELCO-REMY • DIVISION OF GENERAL MOTORS • ANDERSON, INDIANA



GENERAL MOTORS LEADS THE WAY—STARTING WITH

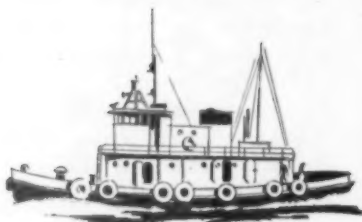
Delco-Remy
ELECTRICAL SYSTEMS

Bronze Pumps Catalog

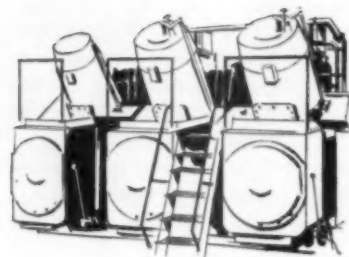
A new catalogue, Number 109, published by the Tuthill Pump Company, Chicago, Illinois, contains complete information on the company's line of bronze positive displacement pumps. These are furnished with capacities from 2 to 50 gpm; and for pressures to 400 psi. The new catalogue describes 61 different pump models that were specifically developed for marine use in applications including lubrication, hydraulic power transmission, liquid transfer and other services. These pumps, of the rotary internal gear type, are furnished with bronze housings, bracket, cover and packing gland. They conform to government specifications for marine use. Included in the new catalogue are model selection charts, data on mounting styles, typical pump characteristic curves, and tables showing relationship of speed, capacity, pressure and power consumption. Complete ordering information on all 61 models is included. Copies of Catalogue Number 109 may be obtained by writing to Department PR, Tuthill Pump Company, 939 East 95th Street, Chicago 19, Illinois.

Personnel Changes

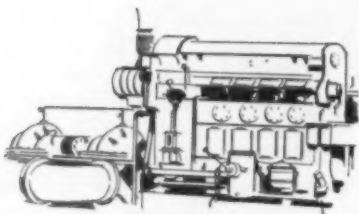
The following personnel changes in the Weatherhead Company, Fort Wayne Division, Fort Wayne, Indiana, are announced by G. P. Robers, General Sales Manager, Distributor Division. John H. Allen, sales manager of the Industrial Distributor Division since 1955, has been promoted to the position of Sales Promotion Manager of the Fort Wayne Division. Mr. Allen will head the overall activities in market research, new products investigation, advertising programs, technical training schools and other procedures relating to the expansion of Weatherhead markets and product lines. In this new capacity, he will work in close liaison with all Weatherhead sales managers and field personnel. John F. Hoine, sales manager of Weatherhead Farm and Construction Equipment Distributor Division since 1956, will replace Mr. Allen as Sales Manager of the Industrial Distributor Division. Supervision of the Weatherhead Farm and Construction Equipment Sales Division will be a responsibility of Edmund T. Duffy in his capacity as Sales Manager of the Weatherhead Automotive Distributor Division.



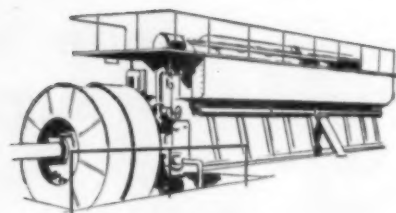
Marine



Engine compressor



Pumping



Stationary



GET THE BEST
FROM THE POWER
YOU BOUGHT...

WITH *Alnor* PROTECTION

Accurate check of exhaust temperatures with an Alnor Pyrometer system can assure minimum fuel consumption per horsepower and long service from the power you bought—without the interruption of many common-cause breakdowns.

At a fraction of the cost of your present engine maintenance bill, an Alnor system can give you advanced warning of:

CYLINDER OVERLOAD	SCALED JACKETS	DETONATION
PREIGNITION	CLOGGED PORTS	FAULTY INJECTION

Series A Pyrometers are designed specifically for direct mounting on diesel engines or other equipment subject to vibration and rough usage. Readings are accurate to within + or -1%. Dustproof, fumeproof, splashproof. Switch capacities of 4, 6, 8, 10, 12 and 16 circuits. Other models to 31 circuits. Get full information—by return mail. Send for Bulletin 4361 with complete details of the Pyrometer and thermocouple assembly designed for your engine.



writes:

ILLINOIS TESTING LABORATORIES, INC.
Room 508, 420 No. LaSalle St., Chicago 10, Illinois

CUSHING, OKLAHOMA

By DOUGLAS SHEARING

AN expansion program that more than tripled the generating capacity of the municipal electric plant has enabled the City of Cushing, Oklahoma, virtually to eliminate purchased power and to slash power costs more than 33 per cent.*

In many ways, Cushing is ideally located for successful power plant operation. This is oil and gas territory and the city has been called the "pipe line center of the world." The pipe lines are so numerous that one company running a new line had to go over or under 259 others. The oil and gas industry provides an economical source of fuel, diesel oil at 7.75 cents a gallon and natural gas at 20 cents per thousand cubic feet. Further, the industry is an important customer of the municipal electric system which supplies a refinery, six oil and gas companies, nine oil well servicing companies and four drillers. The refinery demand alone runs between 1600 and 1800 kw. In addition, there are several small meat packing plants and a prosperous retail business district. Finally, the population of 12,000 keeps increasing its use of electric appliances, particularly air conditioning.

To meet the growing demand, the Cushing plant has expanded steadily since installing its first three 750 hp McIntosh & Seymour diesels in 1935. Also still in operation are an 1170 hp McIntosh & Seymour installed in 1939 and a 1420 hp Fulton installed in 1948. The first four were originally oil-

burning engines but were converted to dual-fuel operation. In recent years, though, the surge of demand was greater than available generating units could handle and the city supplemented plant production with growing blocks of purchased power. In the fiscal year ended June 30, 1956, the diesels turned out 12,119,160 kwhs and an additional 12,222,000 kwhs were purchased. Generating plant costs including labor, fuel, lube, maintenance, supplies and insurance averaged 7.54 mills per kwh and power was purchased at an average rate of 6.08 mills per kwh bringing the average cost of power to 6.81 mills. City officials calculated, though, that modern dual-fuel engines with greater efficiency and lesser requirement for pilot oil could effect important savings.

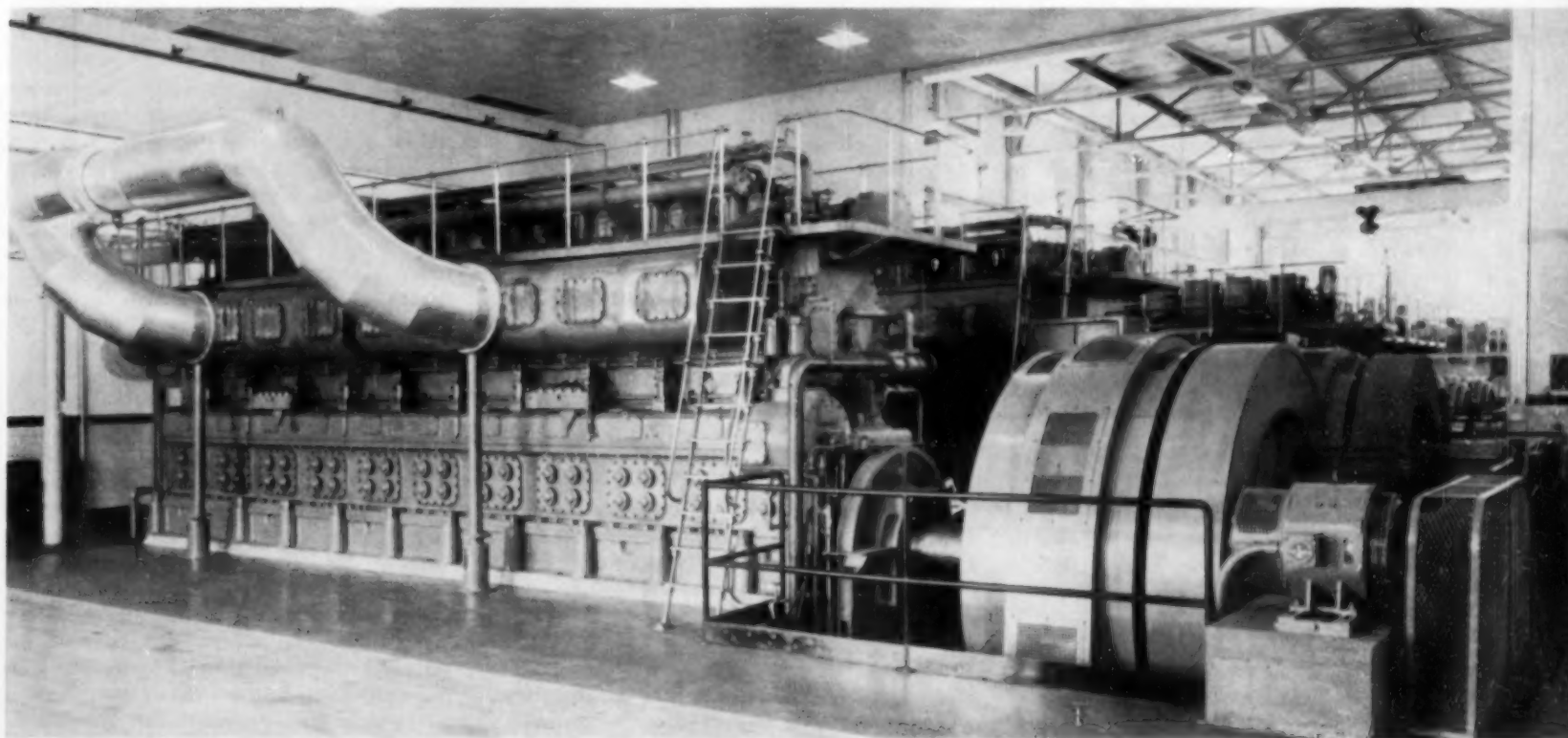
It was decided to expand the plant sufficiently to eliminate dependence on purchased power although this meant actually tripling capacity. A 3560 hp, 2500 kw Cooper-Bessemer turbocharged dual-fuel engine was installed in the older section of the plant. Biggest part of the expansion program was construction of a new plant addition and installation of two identical Fairbanks-Morse dual-fuel engines. Each of these diesels has 10 cyl., 18 in. bore and 27 in. stroke, and is rated at 3500 hp at 277 rpm. Each drives a 2500 kw Fairbanks-Morse alternator. The three new engines were in service by the end of June, 1956, and in the ensuing fiscal year operating results confirmed the

city's judgment. Power purchases were reduced to 2,044,200 kwhs at an average cost of 6.49 mills per kwh. Plant production rose to an impressive 28,326,900 kwhs and total generating costs (again including labor, fuel, lube, maintenance, supplies and insurance) were slashed to 4.40 mills per kwh, a reduction of 41 per cent compared with the plant's previous year. In the 1955-56 year, Cushing paid a total of \$165,799.08 for 24,341,160 kwhs, an average of 6.81 mills per kwh. In 1956-57, with the new engines carrying the bulk of the load, the city paid just \$138,943.46 for 30,368,100 kwhs, a low 4.54 mills per kwh. Thus, Cushing got 6,026,940 kwhs more power for \$27,755.62 less money, an impressive savings.

To appraise the savings conservatively, we have calculated what it would have cost the city if the old engines had produced the same amount as in the previous year and at the same cost, with the balance of the 30,368,100 kwhs purchased at the 6.08 mill rate. On this basis, the new engines saved the city a handsome \$65,283. The total financial picture was bright indeed. Income for the year was \$689,924.24

**Editor's Note—a major part of the program at Cushing was the addition of two 3500 hp Fairbanks-Morse dual-fuel engines. This article is written principally on this phase of the expansion program.*

Looking from the new section into the old section of the Cushing plant, one sees the eight dual-fuel diesels with total capacity of 15,400 kw. The two 3500 hp Fairbanks-Morse units are in the foreground, showing the F-M alternators, Madison-Kipp lubricators, Nugent fuel filters and Woodward governors.



Expenses were:

Generation	\$124,762.23
Purchased Power	13,280.23
Distribution	58,320.67
Administration	11,233.65
Total Expenses	\$207,596.78

Net Operating Gain

\$482,327.46
Of this amount, \$48,400.50 was paid for interest and \$192,723.84 to retire bonds. A big \$115,570.00 was turned over to the city's General Fund. Income from the light plant and the water system pays all expenses of government and municipal services.

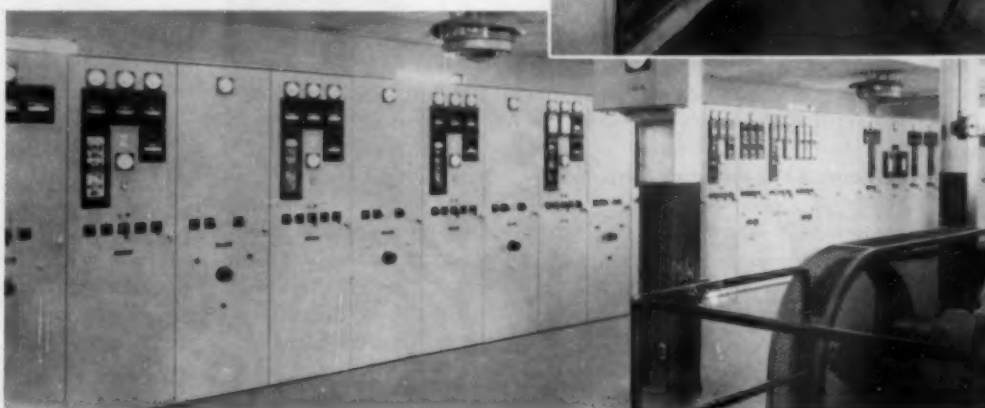
An important element in Cushing's reduction of power costs has been the efficiency and fuel economy of the new engines. Average fuel cost for the plant was cut from 3.53 mills per kwh in the 1955-56 fiscal year to 2.41 mills in the year ended June 30, 1957. Figures on performance of individual engines for the year are not available but test results show the efficiency of the Fairbanks-Morse engines, No.8 in particular. Figuring on the basis of a lower heating value of 958 Btu per cubic foot of gas and a higher heat value of 19,350 Btu per pound of pilot oil, the No. 8 engine at full load used just 536 Btu of oil and 8184 Btu of gas for a total of 8720 Btu per kwh. Translated into costs with 20 cent gas and 7.75 cent oil, this means a pilot oil cost of 0.30 mills and a gas cost of 1.71 mills for a total fuel cost of 2.01 mills per kwh. Costs were also impressively low at partial loads—2.12 mills at 75 per cent load and 2.41 mills at 50 per cent load.

In order to install the two new Fairbanks-Morse engines and generators, make room for a third one and also make space for the new switchboard, an extension 70 ft. 7 in. long and 95 ft. wide was made in exact conformity to the original architecture and plant construction which has always been a model of its kind. It is built of steel-reinforced concrete faced with tapestry brick. Each engine and generator foundation is a solid block of concrete resting on hardpan, extending up through the basement to the engineroom floor level. The foundations are 43 1/4 ft. long and 13 ft. wide spaced 18 ft. from center to center. They are shaped in conformity with the engine base and generator bearers and provide an intact foundation for the exciter. Scavenging air is supplied for each engine by a centrifugal blower with a capacity of 17,700 cfm, inlet volume and a discharge pressure of 2.8 psig. The blowers are each driven by a 300 hp motor operating at 3550 rpm on 2400 volts. Each of the blowers is installed in a separate soundproof room and has its own system of lubrication and oil cooling. An after cooler is installed between the engine and the blower. The engines drive their own pumps for pressure lubrication. Cooling water is supplied by motor-driven centrifugal pumps installed in the basement. There is no item of auxiliary equipment visible at the engine room floor level. The basement with its high ceiling and large amount of floor space is one of the most interesting parts of the plant.

Back in 1935 when the older section of the plant was built the planning was excellent. In the new part built to house the Fairbanks-Morse engines the original plan was again employed, with little

basic modification but considerable refinement. This placed all of the exhaust and air inlets, the silencers and the air filters along the back of the building. The cooling towers were set in the back, close enough to have short runs of pipe to the pumps in the basement. All of the pipes for the jacket water and raw water from the towers are hung snugly against the rear basement wall with branches leading to and from the pumps and the engines. There are no helter skelter pipelines. Jacket water and lube oil heat exchangers are installed near the water mains and the pumps, close enough to the mains for economy in making the installation and efficiency in pumping. This is the general arrangement throughout the plant. In the new section, the pumps, heat exchangers and piping are installed in a neater and more compact manner without sacrifice of working space around them. For both engines there are three raw water and three jacket water pumps, one of each kind being service pumps for each engine and a third pair providing standby service for both engines.

Ultra simplicity characterizes the pressure lube



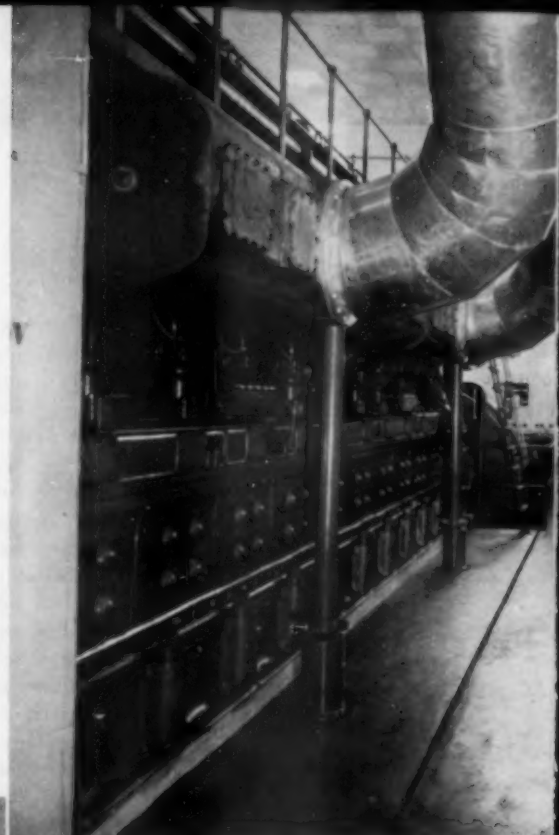
New General Electric switchboard to serve the entire plant was installed at the time the F-M diesels went in.

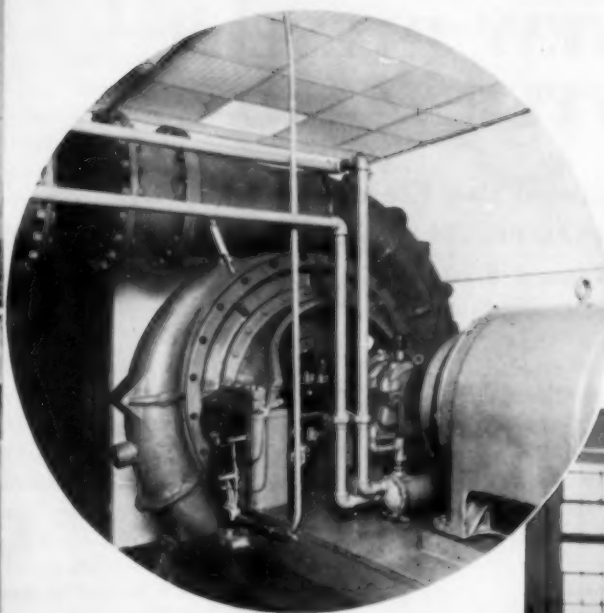
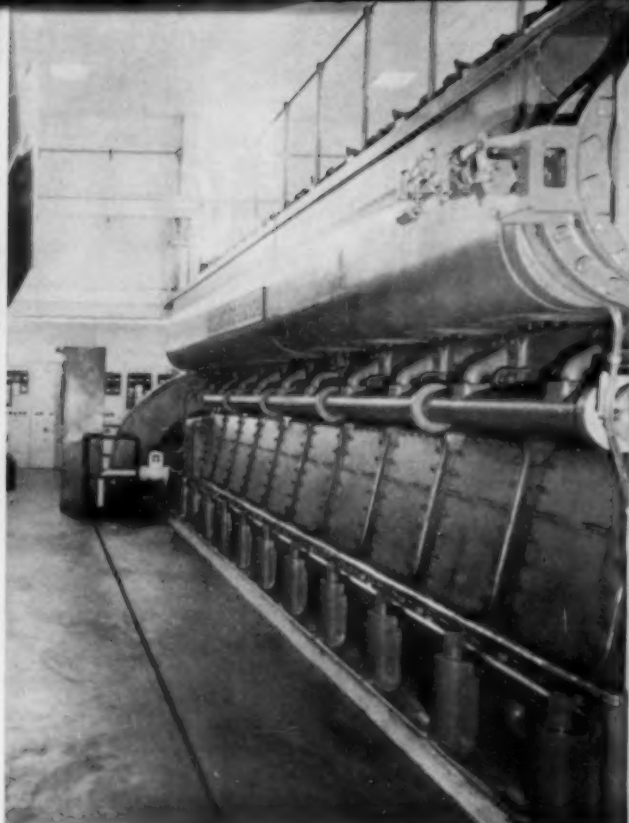
oil system. With the attached pump on the engine, oil is circulated through a twin strainer to the oil cooler and back to the pressure system on the engine. A portion of the oil is continuously by-passed through a clay-type clarifier and back to the engine. A 40 hp motor drives a standby rotary-type lubricating oil pump for each diesel. About 800 gal. of oil are carried in the wet sump engine base and replenished a barrel at a time. There is a square tank in the basement large enough to carry this oil which can be drained out of either engine during over-hauling. A rotary pump is provided to pump the oil back to the engine from the tank. Since the engines are air started there are three cylindrical starting air tanks carrying 250 psi and a 2 stage air cooled compressor with a working pressure of 250 psi located in the basement. Gas from the meters comes in under the floor to the engines. Pilot oil is stored in the original 30,000 gal. tanks that were used for engine fuel before the older units were converted to the use of gas. It is pumped to a gravity tank high up on the engineroom wall in which the level is automatically maintained to provide uniform pressure at the pilot oil pumps.

One important accessory is the combined instrument panel and alarm system. On this panel are gauges showing the pressure of starting air, jacket

water, gas before regulator, jacket water temperature in, lube oil pressure, fuel oil pressure, manifold air temperature, jacket water temperature out, and lube oil temperature out. Also, there is a 10 point pyrometer for exhaust temperature reading. The alarm system flashes a tell-tale light and sounds a howler if pressures or temperatures fall or rise beyond a pre-determined danger point. With everything normal, this panel provides readings for all essential operating functions.

Industrial architecture of the building is as functional as it is pleasing in appearance. The original structure carried a parapet 16 ft. wide on the front side over spaces not requiring height such as the foyer, office, etc. On the new section, there is a similar parapet in the back over the scavenging air blower rooms. The deck of this parapet has provided a convenient place to mount the tall exhaust silencers on vibration dampeners and the self cleaning air filters which are therefore directly over the blowers. On the original installation, air filters are close to the ground. The new ones, being high up, are clear of much of the dust stirred up by trucks moving to and from the shop back of the engineroom. Also, this installation on the parapet looks better than the conventional arrangement of long pipes attached to the back of the building. It was decided that all of the switch-

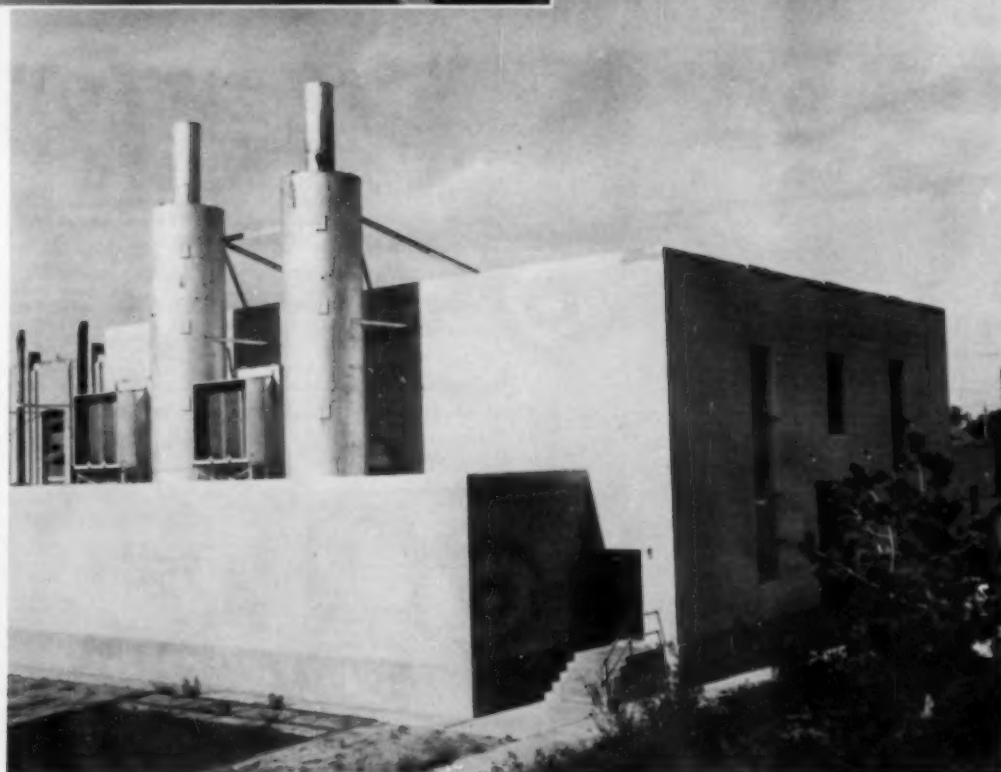




Scavenging air for each of the big F-M engines is supplied by a Roots-Connorsville blower driven by an F-M motor.

Beside each F-M engine is a Universal Equipment panel with Alnor pyrometer, Liquidometer fuel level meter and Marshalltown gauges. The Woodward governor can be seen on the engine.

Looking down the aisle between the two new 3500 hp Fairbanks-Morse dual-fuel engines in the Cushing plant.

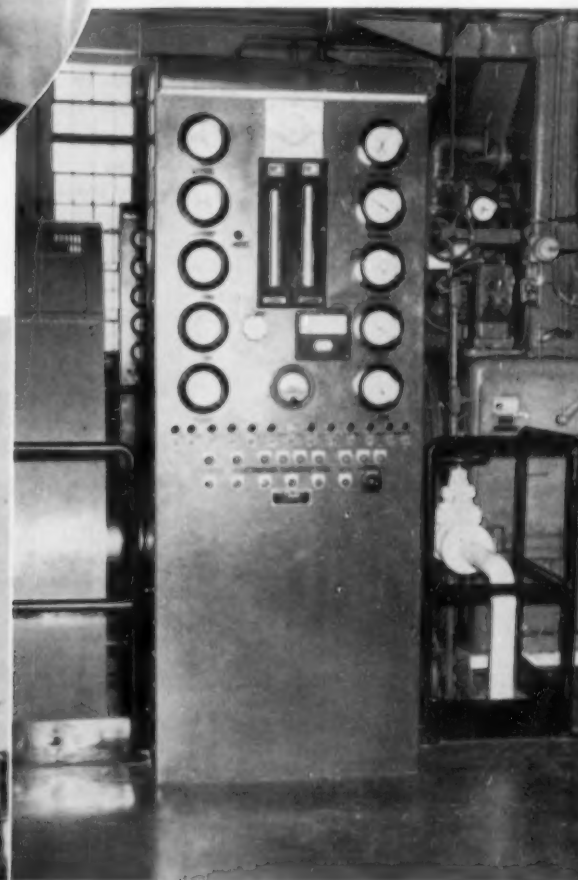


This new section of the Cushing municipal power plant houses two 3500-hp. Fairbanks-Morse dual-fuel diesels, major part of an expansion program that tripled the capacity of the plant. This view shows the Maxim exhaust silencers and American air filters.

gear should be renewed and installed in the new extension. The new board, of dead front type with totally enclosed back, is made up in two parts with eight panels in each part. Panels in one part each carry a polyphase watt-hour meter, power relay, hour counter, ammeter selector switch for 3 phase reading, volt meter, breaker control, synchronizer and governor control. In the other group of panels there is one station feeder with ac megawatt recorder and ac kilowatt recorder. Distribution feeder panels for the eight generators each have a three line over-current relay for each of the three phases and each one carries an

ammeter at the top.

C. H. Gurnsey & Company are the engineers responsible for the design of this excellent plant and the Hoke Construction Company was the contractor. The project was carried out under the auspices of the city commissioners: Claude C. Wylie, Chairman; Hugh R. Hughes, Vice Chairman; Gene N. Hancock, W. L. Kline, and Leonard C. Blood. L. L. Houston is City Manager, Clifton Lee, City Clerk, and Sterling Grubb, City Attorney. Responsible for operation at the plant is Russell Acklin, Chief Engineer.



Equipment Servicing Fairbanks-Morse Engines

Engines	Fairbanks-Morse
two 10 cylinder, 18 x 27 in., 3500 hp, 277 rpm model 51AD 18 dual-fuel engines.	
Generators	Fairbanks-Morse
Scavenging blowers	Roots-Connorsville
Main switchboard	General Electric
Governors	Woodward
Fuel filter	Nugent
Mechanical lubricators	Madison-Kipp
Standby lube oil pump	Roper
Standby lube oil pump	Fairbanks-Morse
Lube oil duplex strainers	Elliott
Lube oil filters	Hilco
Heat exchangers	Ross
Air compressor	Gardner-Denver
Fuel level meter	Liquidometer
Gauges	Marshalltown
Silencers	Maxim
Air filters	American Air Filter
Lubricating oil	Sinclair
Consulting Engineer	C. H. Gurnsey & Co.

TWO NEW DIESELS FROM INTERNATIONAL

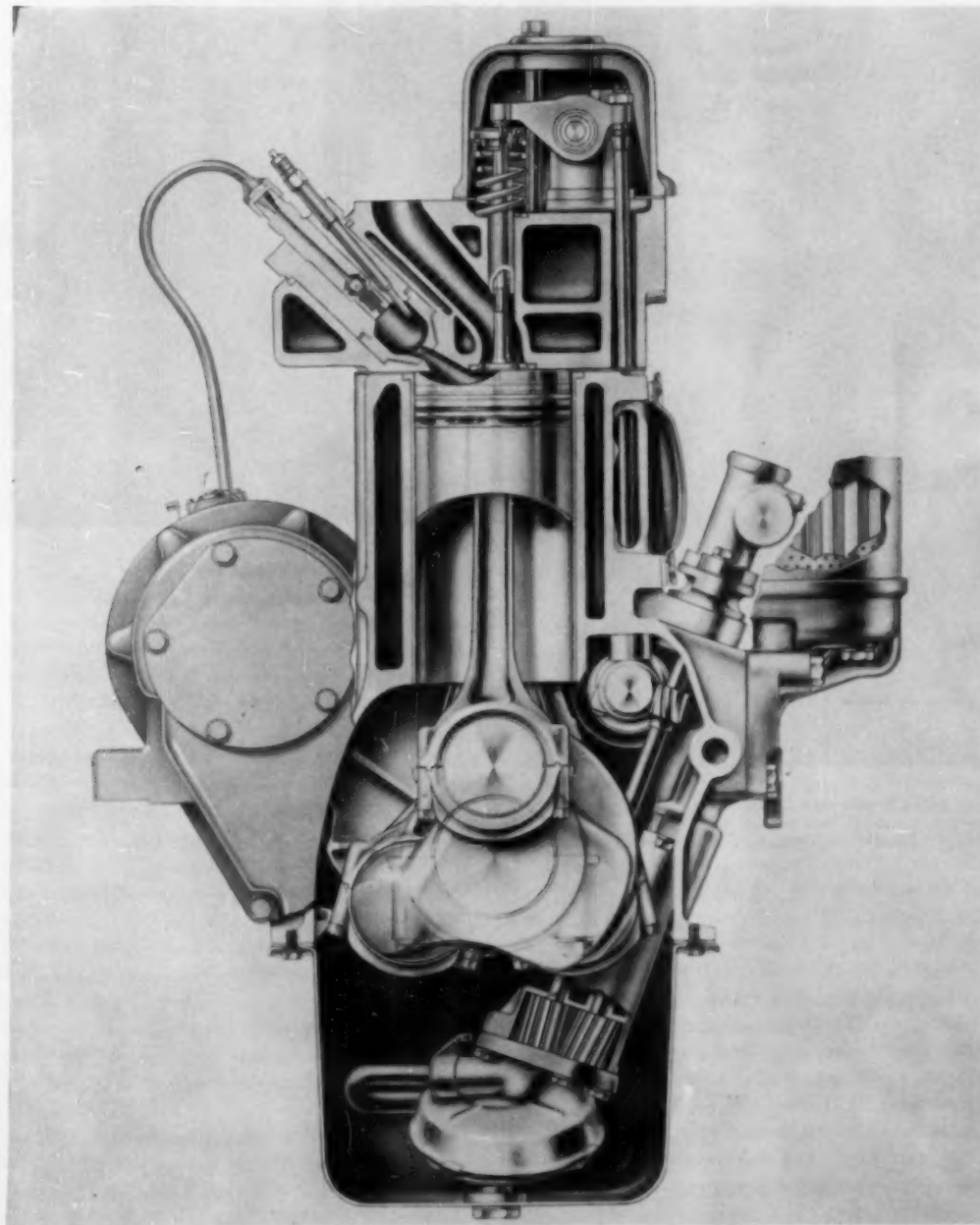
Direct-Start Engines, the First Produced by International Harvester, Are Heavy-Duty Units Developed for Broad Industrial Application

ONE of the most significant engine developments to come out of International Harvester's Melrose Park, Illinois plant recently is a new set of six cylinder diesel power units, UD-236 and UD-282. In the middle horsepower range of its well known line, the two engines are rated 75 and 90 horsepower maximum at 2400 rpm, a speed somewhat higher than other International tractor and industrial models. The engines are specifically built for heavy-duty applications and have already

been used in the company's wheel tractors.

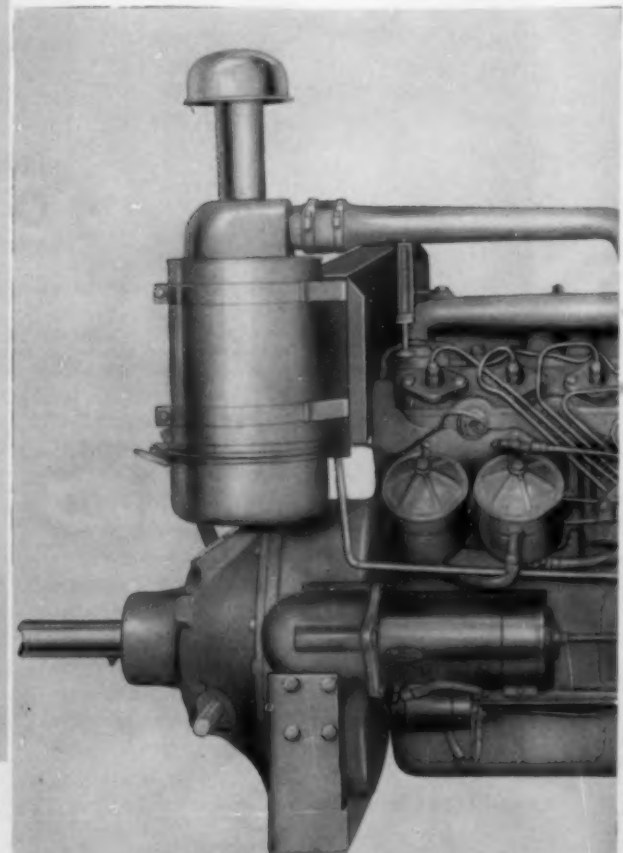
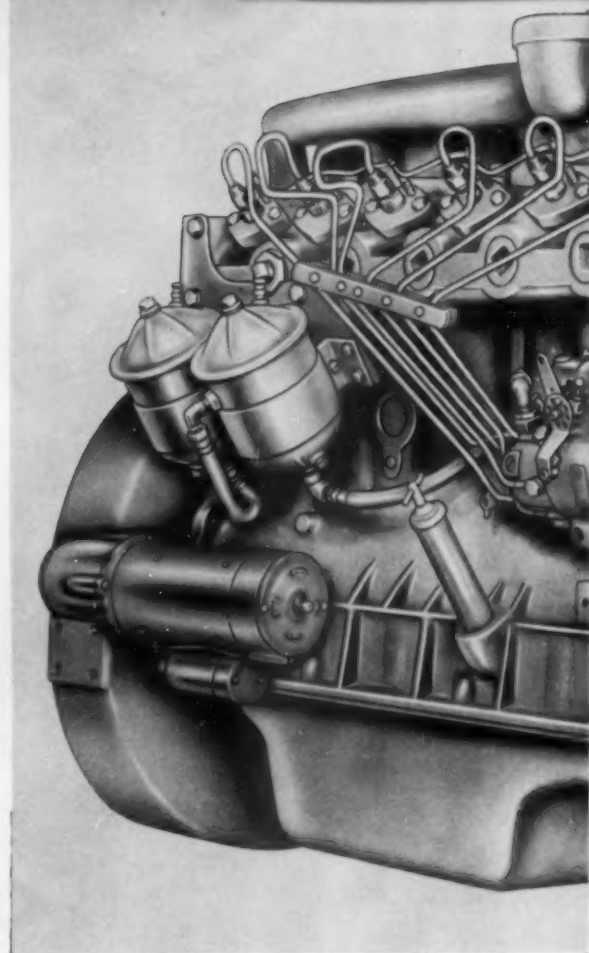
Both the UD-236 and UD-282 are direct-start engines, the company's first, retaining International's proven pre-combustion chamber. A glow-plug for each pre-cup is standard. This too is International's first interchangeable engine line, the two diesels being interchangeable with carbureted engines both in power and dimensions. Because of their heavy-duty design, many of their parts are com-

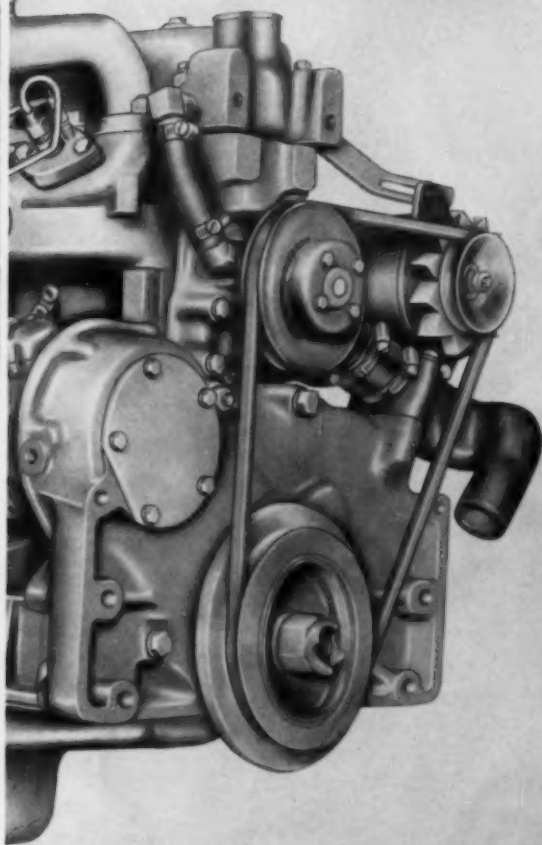
Front cross section of the new six cylinder International UD-282, 90 hp engine.



mon. The UD-236 has a bore of $3\frac{1}{8}$ in. and the same dimension stroke with a 236 cu. in. piston displacement. Bore on the 282 is also $3\frac{1}{8}$, but a longer stroke of 4.390 in. gives it a 282 cu. in. displacement. Both engines have a 17.6:1 compression ratio.

Engineering officials at International stress the new features of these engines and point in particular to valve-in-head design, replaceable cylinder





Right side of the 75 hp UD-236 engine with Roosa-Master fuel pump. Twelve volt direct electric starting is used on both models.

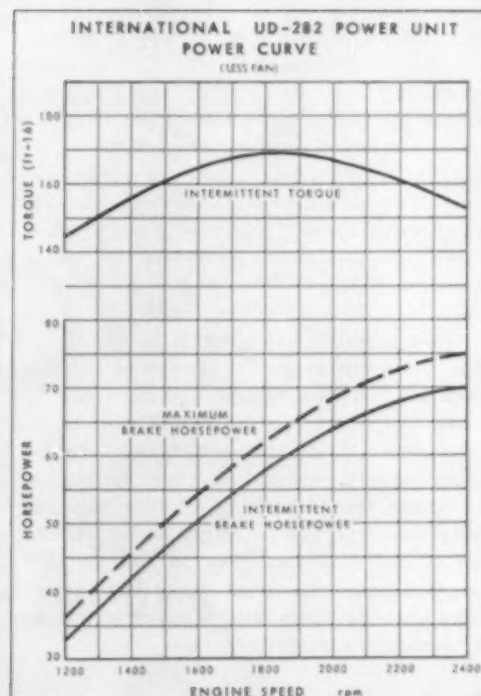
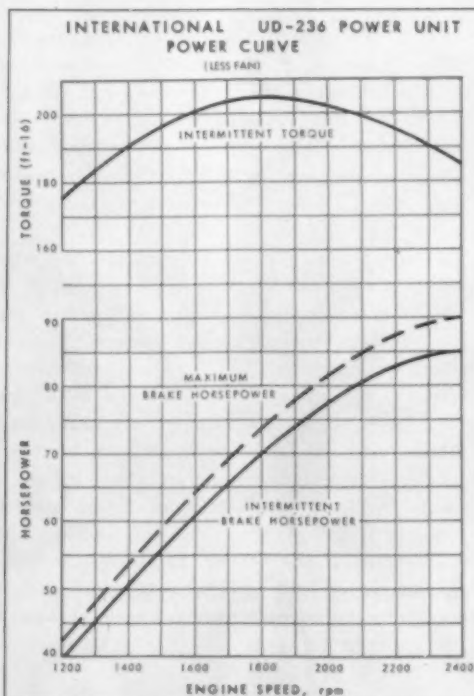
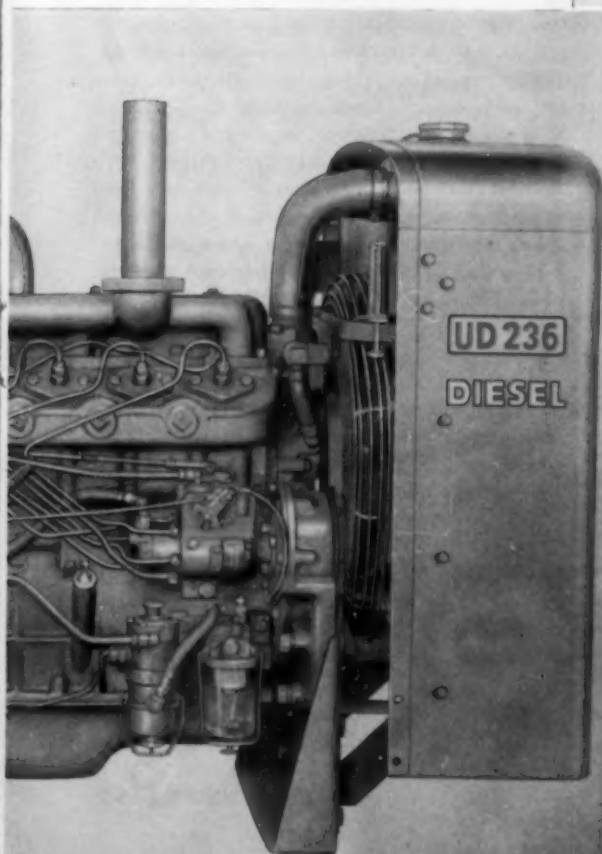
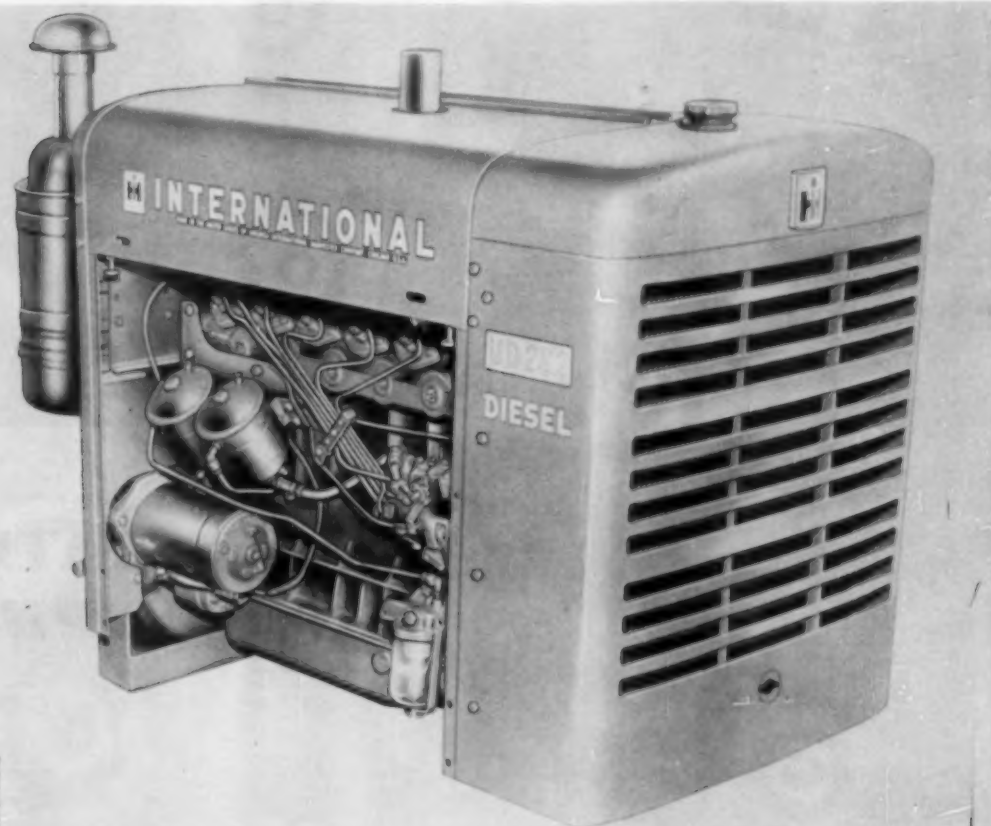
The International UD-282 power unit weighs 1460 lbs and is complete and ready to operate.

UD-236 open type power unit with clutch take-off. Rated load speeds to 2400 rpm are available to suit application requirements.

sleeves, thru-hardened, counterbalanced crankshafts and gear-driven induction hardened camshafts. The fuel injection system is simple and accessible with automatic advance for good fuel economy. Injection nozzles are of the single-orifice type by American Bosch having a 1600 psi opening pressure and a Roosa-Master distributor type fuel injection pump is used. This, combined with the conical shape of the pre-combustion chamber, assures complete mixing and burning. The conduction-cooled three ring (two compression-one oil) piston retains International's conventional dish-shaped top. The engines have a full pressure lubrication system and all passages are rifle-drilled. Full-flow filtering of lubricating oil is employed with plastic-impregnated paper filter elements.

A full-flow by-pass cooling system employs a thermostat which controls the temperature for fast warm-ups and assures full-flow of water through the radiator in high ambient temperatures.

The UD-236 and UD-282 as complete power units with clutch take-off have respective weights of 1410 and 1460 lbs. Physical dimensions of both units are similar. The 236 has a length of $64\frac{3}{8}$ in. with a 28 in. width and $42\frac{3}{4}$ in. height. Length of the 282 is $65\frac{1}{2}$ in. with a width and height identical to the 236. Both engines are available with extended shafts and outboard bearings where wide-face small-diameter pulleys must be used to obtain satisfactory speeds for driven machinery, or where more than one pulley is necessary.



Margaret Humphrey, 17, of Chagrin Falls, Ohio, smashes the traditional bottle of champagne on a capstan of the new 132 ft. diesel towboat in christening ceremonies at Pittsburgh. Miss Humphrey is a granddaughter of George M. Humphrey in whose honor the vessel was named.



CONSOLIDATION COAL ADDS M/V HUMPHREY TO FLEET

By DWIGHT P. ROBISON

A SLEEK diesel towboat that Dravo naval architects believe is the most efficient of its draft ever built will enter the coal towing trade at Pittsburgh shortly. Built at Dravo Corporation's Neville Island shipyards for Consolidation Coal Company, of Pittsburgh, the 132 ft., 1600 horsepower vessel has been christened the *Humphrey* in honor of George M. Humphrey, former Secretary of the Treasury and a director of Consolidation Coal. The boat is the fifth in Consolidation Coal's fleet. After the christening, approximately 125 guests were served dinner on a barge pushed by the *Humphrey* during a two-hour ride on the Monongahela River.

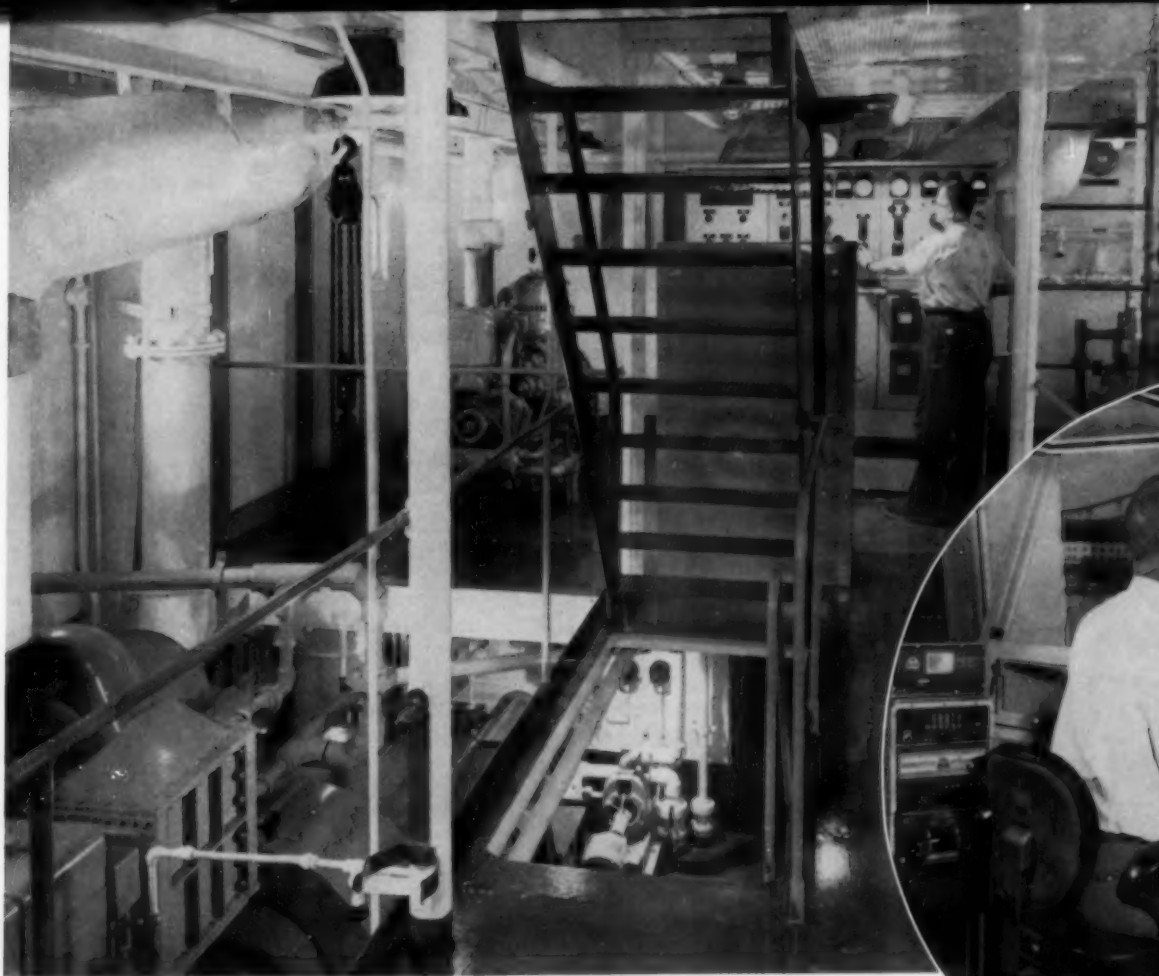
Designed primarily for operation in the narrow locks and relatively shallow channel of the Monongahela, the *Humphrey* has a beam of only 27 ft. and a draft of 6 ft. 9 in. She will move barges between mines on the Monongahela and Allegheny Rivers and customers' plants on both the Monongahela and Ohio Rivers. Above West Elizabeth landing, she will push six barges loaded with 900 tons of coal each. Downriver on both the Monongahela and Ohio, where larger locks permit larger tows, the load will be increased to at least 11 barges with a total of 9900 tons.

The *Humphrey* is powered by twin White Motor Company, Superior Model 40Sx2-8, marine diesel engines, equipped with Falk reverse-reduction gears. Each of the 8 cylinder turbocharged engines delivers 800 continuous horsepower at a propeller speed of 225 rpm. Both engines and reverse-reduction gears are mounted in the hull on an integral foundation forward of amidships. Electric power for 120/208 volt, three-phase, 60-cycle alternating current is supplied by two General Motors (Detroit) diesel generator sets of 75 kw capacity.

The new vessel embodies the most advanced principles of scientific marine design, developed by Dravo in an intensive program of research and model basin testing in Wageningen, Holland. Hull refinements have resulted in stern lines that are longer and leaner than those of most boats and stern tunnels that are broader than usual. Modifications also have been made in the design of the rudders, Kort nozzles, propellers and struts. Both the shape and location of the six rudders have been altered, while the Kort nozzle shape, particularly at the bottom, has been refined for greater thrust. Hull rigidity has been increased by designing the superstructure as a main element of the girder of the vessel.

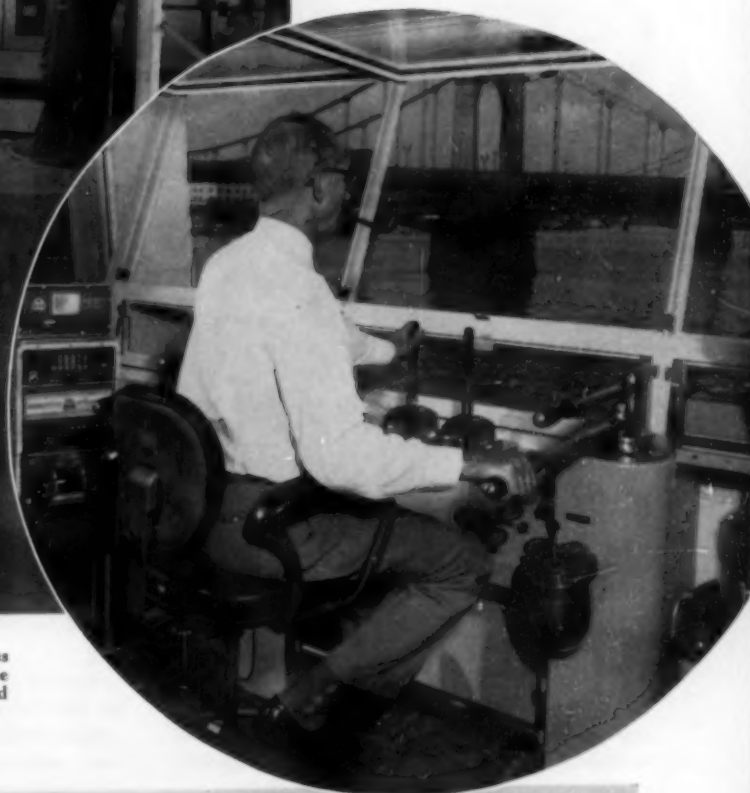
Hull forward is of the spoon bow type. Fenders and the three towing knees are of all-steel, welded construction. The towing knees are built into and form a part of the headlog. The hull aft is formed to house the two propellers in specially designed Kort nozzles, which are shaped into the hull. Bottom plating from a point one foot forward of the flanking rudders to the stern is 20 per cent stainless clad steel. Rudders and Kort nozzles also are fabricated of stainless clad steel plate. The four-bladed, seven-foot-diameter propellers are of high tensile stainless steel. Pitch, area and blade form is designed for Kort nozzle application. Both propellers rotate inboard for ahead propulsion. Each propeller shaft is supported just aft of the propeller by a single streamlined steel strut, attached to the hull and carried down to the inside of the nozzle. The strut arm is covered with stainless steel trim.

The *Humphrey* has two steering systems, one for flanking and one for steering ahead. Two streamlined, balanced flanking rudders are located forward of each propeller and one Oertz-type steering rudder aft of each propeller. Steering engines are located above deck level for easier access. Each system consists of a double plunger type hydraulic



Engine room of the *Humphrey* is located just forward of amidships. Vessel, which was built by Dravo Corp. for Consolidation Coal Co., is powered by two Superior marine diesel engines, each rated at 800 hp with a propeller speed of 225 rpm and equipped with Falk reverse reduction gear.

Pilothouse of the new diesel towboat is equipped with modern navigation aids including radar, ship-to-shore radio, hydraulic steering controls, and power telephones.

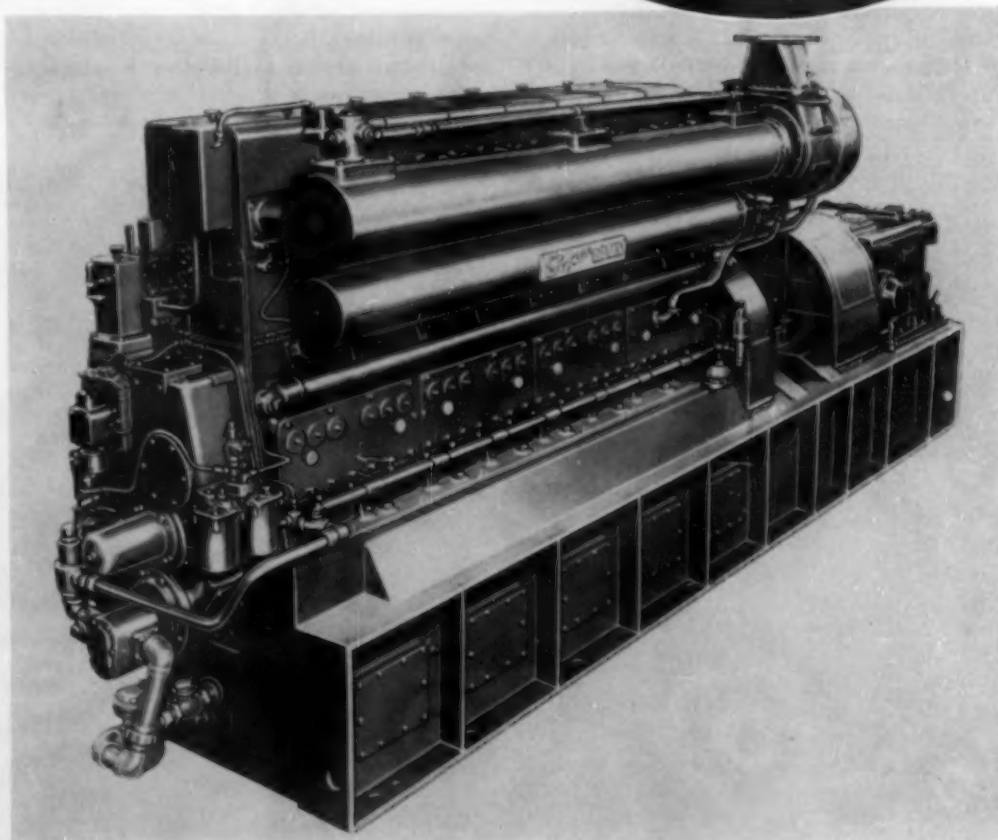


ram, four-way closed center control valves, and control and follow-up mechanism. A motor-driven pump operates both rams, with a second pump cutting in automatically if the first pump fails to maintain sufficient pressure. The steering control valves are operated by a mechanical follow-up type linkage from levers in the pilothouse. Through the follow-up system, the pilothouse levers give the pilot a constant indication of rudder position. Modern navigational aids for the vessel include radar, sound-powered telephones, hydraulic steering controls, and ship-to-shore radio. Quarters are in the main deckhouse and upper deckhouse.

The *Humphrey* is the ninth towboat built by Dravo for Consolidation Coal. She joins three vessels still in operation—the identical 108 ft. diesel-powered *Arkwright*, *R. L. Ireland* and *Mathies*. Five steam-driven vessels have been retired in recent years. The firm also operates the *Elizabeth*, a 40 ft. harbor boat.

Principal Equipment Suppliers

Main Engines	Superior Model 40Sx2-8
Reverse and Reduction Gears	Falk
Generator Units	Detroit Diesel
Air Compressors	Quincy
Lube Oil Filters	Hilco
Lube Oil Strainers	Air-Maze
Jacket Water Coolers	Ross
Lube Oil Coolers	Ross
Intake Air Filters	Air-Maze
Switchboard	Lake Shore Electric



Superior 40-S2X-8 engine can be supplied with gear mounted as above, but Dravo Corp. designed a special mounting for engine and gear as part of engine room foundations.

DIESELS HELP PRODUCE AND DELIVER CARTHAGE MARBLE

By L. H. HOUCK

CARTHAGE Marble, a product of the quarries and finishing plants of the Carthage Marble Corp., in Carthage, Mo., is known all over the world. Scan a list of famous buildings throughout the country, past and present, and you'll find Carthage Marble. More than half a million dollars worth of this beautiful stone is being used for example in the \$35 million dollar State Department Building in Washington, D. C. Years ago, it was supplied for parts of the national Capitol building. A few examples of the use of this gray textured stone are the Missouri Capitol building and George Washington Carver Junior High School in Los Angeles. Carthage Marble is used in dozens of universities including Harvard, Wisconsin, Missouri, Illinois. The scope of hospital construction ranges from St. Michaels and St. Francis in Milwaukee to Allegheny County Hospital in Pittsburgh, Fitzsimmons in Denver and Chronic Diseases Hospital in New York City. Carthage Marble is delivered by its own trucks which annually travel over 90,000 miles. Each of its four International tractors is powered by a model NH 220 hp Cummins diesel engine.

It is a well known fact that quarrying, cutting and polishing marble is a precise operation. What is little known is that delivery of this quality stone after it has been finished can seldom be trusted to other hands. Delivery is made in open bed trailers. Each piece must be carried on edge

to avoid breakage. This has led to the development of wooden crates and A frames bolted to trailer floor for use in holding the finished slabs on edge in the trailer. An average load is valued at \$7000.00. This presents a problem in loading. Most of the pieces have been cut and finished to dimensions according to the architect's plans. It must then be identified, crated and loaded so that the complicated jig saw puzzle can be solved by the skilled marble setters who put each piece in place some thousands of miles from its source.

Carthage Marble, Missouri variety, has been quarried at its present site for more than 70 years, and exhaustion of the valuable beds cannot be foreseen. It is not merely another limestone but a marble, capable of taking a high polish. As such it has been placed in the Class A category by the Marble Institute of America. Weathering tests showed that after 1,735 freezings there was no effect of frost action and the marble was still in excellent condition. This high quality is the sound reason for its general acceptance.

Quarrying of marble starts with the removal of overburden which ranges from 10 to 40 ft and consists of clay and surface rock. Two diesel powered units usually work together to keep underburden cleared off ahead of the crews. They are an Allis-Chalmers HD-11 with dozer powered with an Allis-Chalmers diesel and a 3/4-yd Lorain shovel

with a Caterpillar diesel engine. Removal of the overburden leaves a flat, almost horizontal bed of marble. This distinguishes the Carthage quarry from other marble operations where the marble often lies at an angle. This bed of marble must be cut up in huge slabs from which mill machinery will slice off sheets. Cutting the slabs has been done the same way for half a century by cross cutting with wire cables running in flint sand mixed with water. Splitting the slabs is done with wedges and pneumatic drills. Channeling machines using chisels and running on track up to 30 ft long are part of the operation which reduces the bed to huge slabs of acceptable building marble, ready for the finishing and cutting mill. Marble production has been developed to



Two Gardner-Denver wagon drills and a Gardner-Denver air compressor powered with a 6-110 GMC diesel, are important units in the drilling operation. Left background is a channeling machine.

Marble delivery takes place during all types of weather. Note sand boxes for rear wheels. Each Cummins diesel equipped truck does approximately 90,000 miles annually and a single trip may take a week or more.

Mechanic in Carthage Marble Corp. service shop checks Luber-Finer lube oil filter. On return trips tractor goes into shop for lubrication and service while trailer is loaded for next trip.

Gardner-Denver air compressor powered with a 6-110 GMC diesel supplies air for a battery of air drills including the two Gardner-Denver wagon drills shown in the background.

a science that saves all usable material. Much of the overburden consists of rock that tests up as good limestone. This rock is drilled and blasted and converted into aggregate, agricultural lime, sugar refinery rock, sewage filter rock, roofing and also for asphalt aggregate.

Most of the heavy drilling is done with two Gardner-Denver wagon drills supplied with air from a Gardner-Denver 600 air compressor powered with a 6-110 GMC 2-cycle diesel. After the loaded holes have been detonated, the broken rock is loaded by a 4-yd Lima 180 shovel powered with a Cummins diesel, into a mixed fleet of hauling units. Two of these are Koehring Dumpsters powered with 3-71 GMC diesels. A 1/2 yd Bucyrus-Erie shovel, powered with a 3-71 GMC diesel, also works in this part of the operation. Other diesel powered equipment includes a White dump



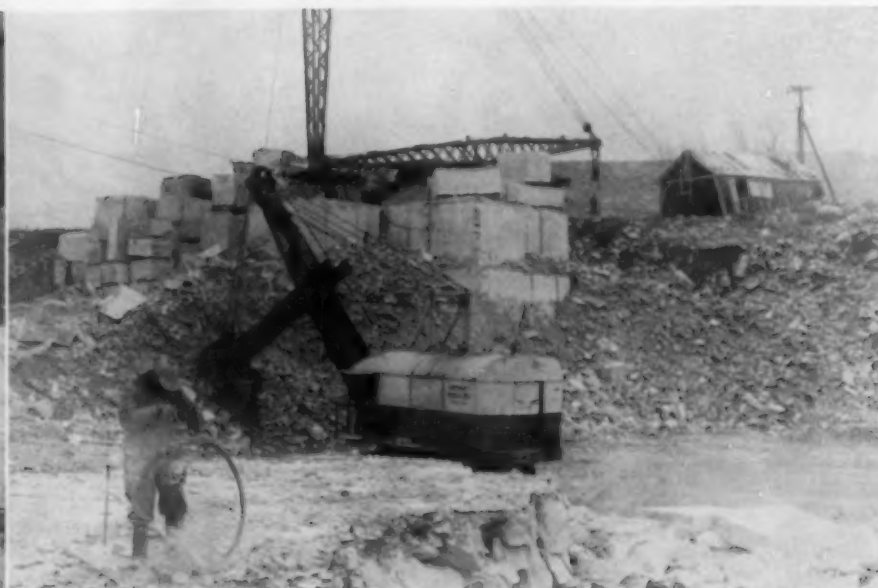
truck with a 4-71 GMC diesel, a D6 Caterpillar tractor with dozer and three reserve quarry hauling units consisting of 6-wheel trucks equipped with 275 hp Cummins engines.

Elliott Potter, assistant to President Roy E. Mayes, said: "Ours is one of the few industries where the raw material is taken from the earth, cut and fabricated to specifications, delivered and installed by one company. We are one of the few companies which maintain a fleet of trucks to make direct delivery of marble products," Potter said. "We have found that the use of our own trucks offers many important advantages to our cus-

tomers. Delivery is more prompt because the marble is taken directly from the finishing plant to the job location. Direct shipment practically eliminates all breakage and damage which might be caused by rough handling in transfer. The company driver makes sure that the marble is unloaded with the care it deserves. Years of experience has made our transportation engineers expert in the proper handling of marble."

Lack of power machinery once made marble the most precious of all building materials. Modern power, most of it diesel, now makes marble available for all structures at moderate cost.

4 cu yd Lima 180 shovel is powered with a Cummins diesel. It loads blasted rock into dump trucks which haul it to the crusher where it is made into aggregate, ag-lime and other by-products.



PROPER SELECTION AND INSTALLATION OF DIESEL LUBRICATING OIL PUMPS

Viking Heavy-Duty Circulating Unit Used for 3500 KW Enterprise Engine at Waverly, Iowa Cited as Good Example of Proper Application

By ANTHONY WAGNER*

WHAT the heart is to the human body, the lube oil pump is to the diesel engine. The basic difference lies in the fact that a human being has no choice in the matter of a heart selection. The diesel engine manufacturer can choose the proper pump to circulate the engine lube oil. Furthermore, he can assure long service and low maintenance by a good installation of the proper pump. With regard to the oil circulating system, diesel engines are of two types, the dry sump or wet sump type. In the wet sump type, oil from the main bearings drops back into the crankcase where it is picked up by a pump and returned into the pressure system. The circulating pump for the majority of the wet sump type of engines is generally driven directly from the main shaft of the engine although, in some cases, a separate electric motor driven pump is utilized. The dry sump engine has a supply tank that is separate from the main engine and a separate electric motor driven circulating lube oil pump. After the lubricating oil has passed through the bearings of the engine, it flows through a return line to the supply tank. Whether dry sump or wet sump, diesel engines are normally equipped with an

*Chief Research Engineer, Viking Pump Company, Cedar Falls, Iowa

auxiliary pumping unit for continuous lube oil circulation as a few minutes operation of the engine without the benefit of lubricating oil would be sufficient to cause severe damage. Also in the case of the wet sump engines having engine drive pumping units, electric driven "pre-lube" pumping units are generally installed to circulate the lube oil through the bearings before the engine is turned over and started. Either type of design requires the correct selection of pumping unit for the job and of equal importance is the proper installation of the pumping unit. As the lubricating oil acts as the life blood for the engine, any error in judgment in selection and installation of the circulating oil pump would be disastrous as expensive engine damage, loss of operating time could result. Diesel engine driven pumps for wet sump engines are generally built into the engine as part of it. In some cases the Diesel engine manufacturers supply their own pump components but in others, the manufacturer purchases parts of recognized pumping units and incorporates them into the engine itself.

The recent installation of a newly developed 16 cylinder, V-type turbocharged dual fuel engine at the Waverly, Iowa municipally owned West Power Plant is an excellent example of the proper appli-

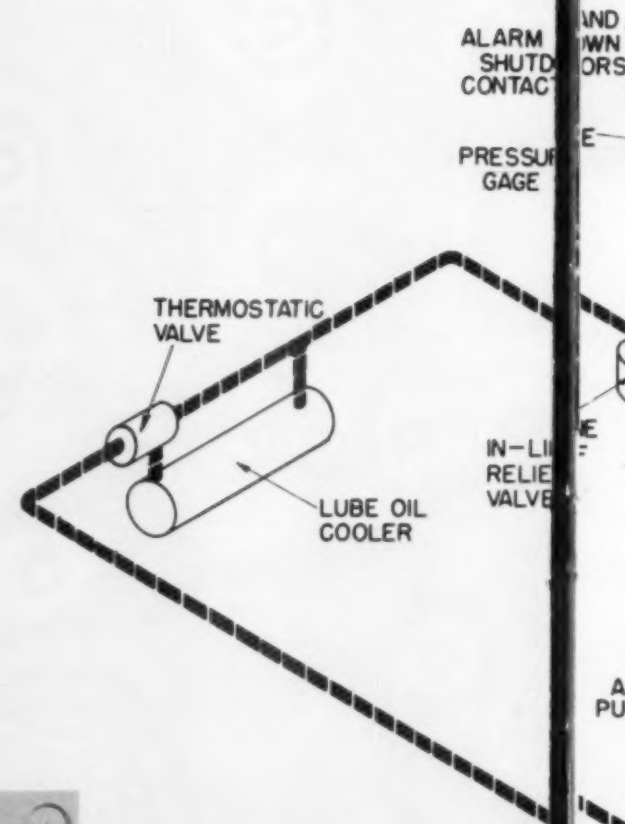


Figure 1
Schematic diagram of the lubricating oil system at Waverly showing both the heavy-duty Viking unit and its auxiliary.

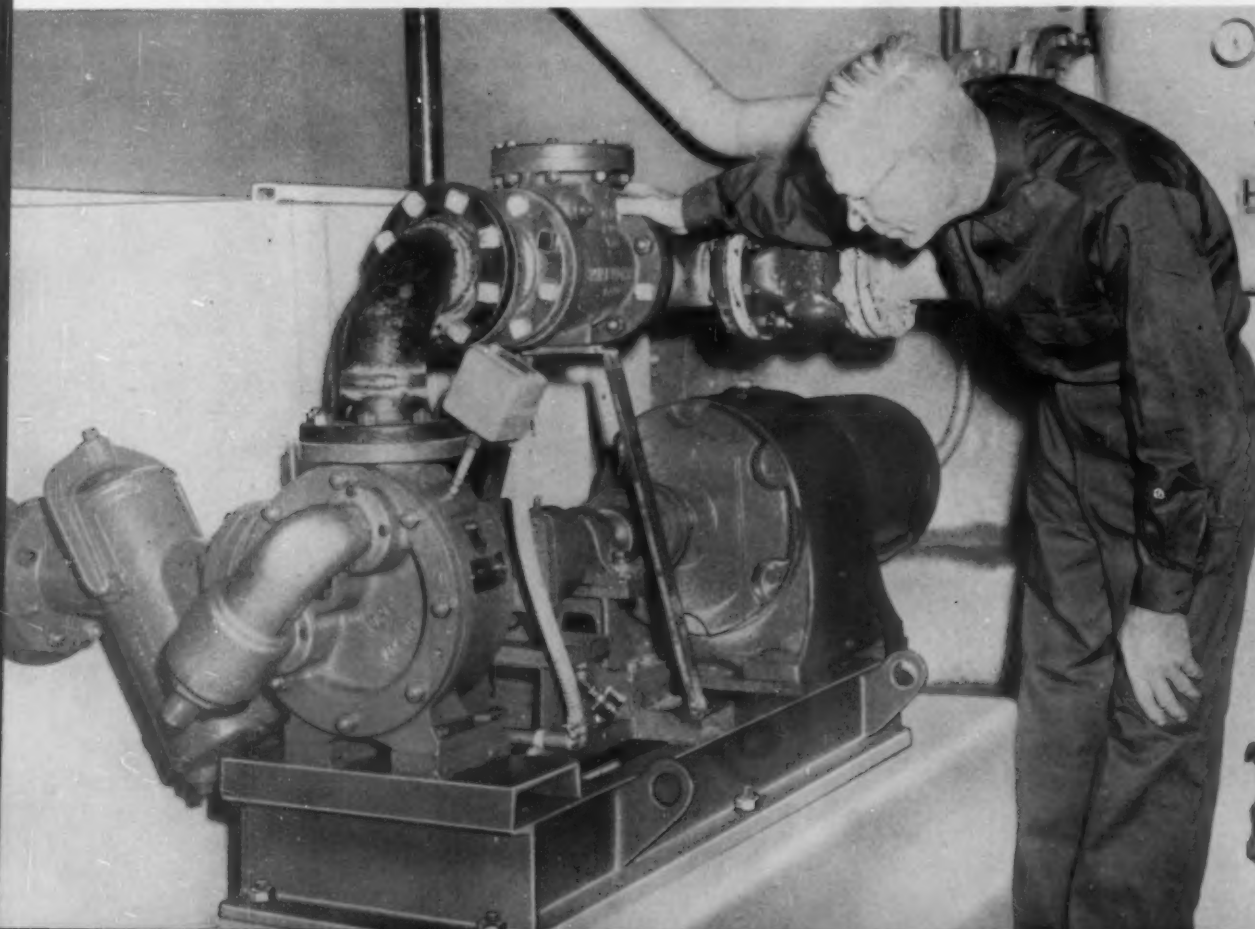
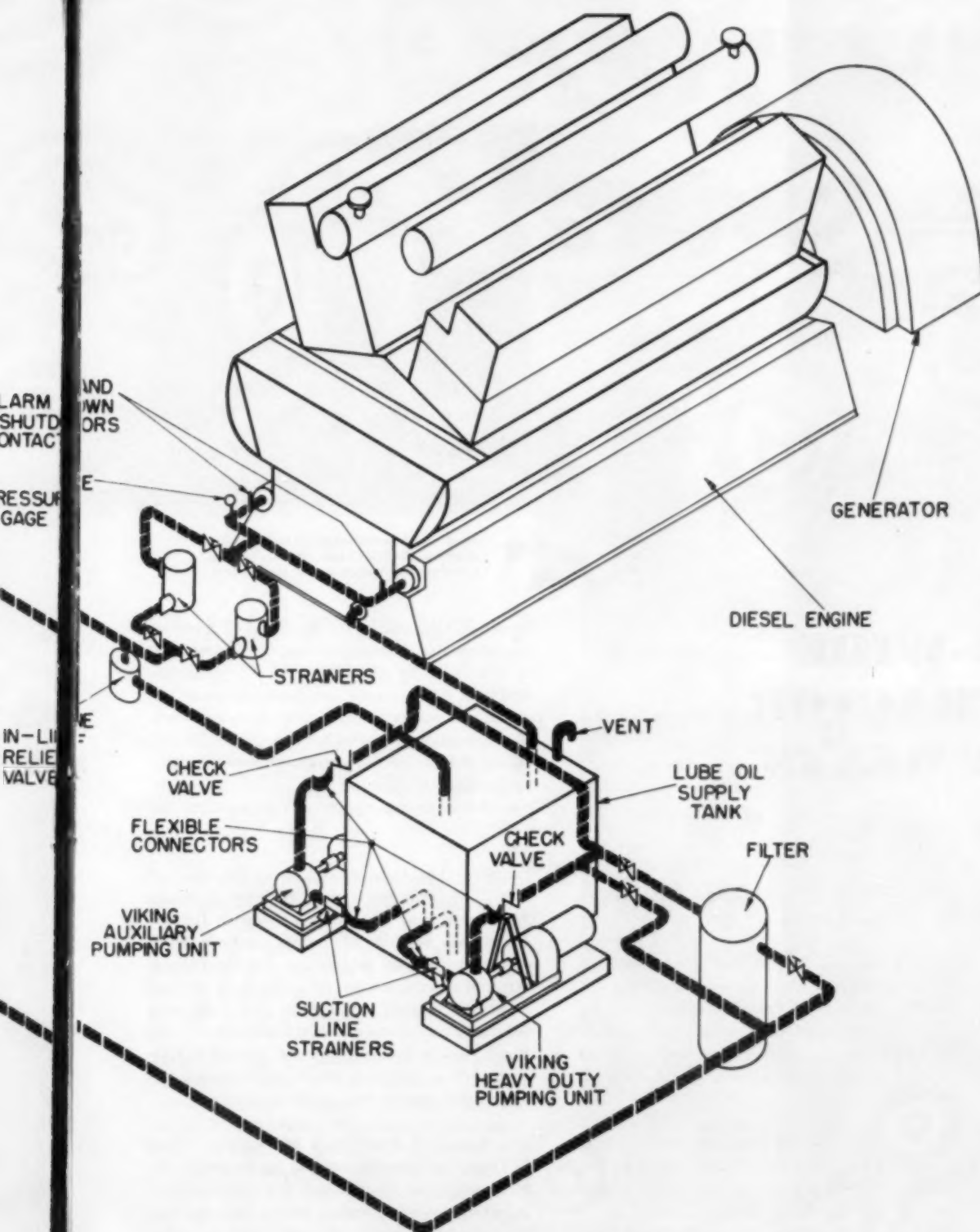


Figure 2
Operator checks the main Viking pump installed in the lower level of the Waverly power house. Relief valve mounted on pump head is designed for pump protection rather than flow control.



cation of a main circulating oil pump to a dry sump engine. This engine, manufactured by the Enterprise Engine Division of General Metals Corporation, model RV-16, is rated 3500 kw and a Viking heavy-duty pumping unit was carefully selected for this service and just as carefully and correctly installed. In selection of a diesel engine circulating oil pump, certain pertinent factors were taken into consideration in order to obtain long operating life and low maintenance from the pumping unit. Below are listed some of the important factors considered:

1. Capacity required in gallons per minute.
2. Liquid viscosity at pumping temperature.
3. Selection of correct pump size.
4. Selection of proper type and class of pump for duty required.

5. Determination of the proper size of suction piping based on length of run and viscosity.
6. Determination of proper size for discharge piping, based on same consideration.
7. Determination of horsepower required, based on all operating factors.
8. Selection of materials of construction for pumping unit.
9. Consideration of the temperature of the material to be pumped.
10. Selection of the mounting and drive arrangement.

The Viking heavy-duty pumping unit in the straight-line design was recommended because of its rugged construction and the integral thrust bearing which positively positions the rotor and

shaft even under extreme pressure operation. This design unit is also quieter in operation and to further insure quietness in operation and also compactness of installation, a gear head motor drive was recommended with direct coupling to the pump, all on a fabricated steel base. In order to avoid cavitation under certain operating conditions, a 4 in. suction line and 4 in. ports were supplied on the heavy-duty unit. Calculation of the discharge line losses plus 55 psi inlet pressure to the engine also dictated the requirement of 4 in. discharge line and ports. Selection of the 4 in. suction and discharge lines will result in lower pump operating pressure and subsequent longer pump life. Figure 1 illustrates the piping diagram for the Waverly installation. Pumping unit was mounted on a concrete foundation, steel reinforced, and doweled to the existing concrete floor with reinforcing steel. Six $\frac{3}{4}$ in. foundation bolts hold the unit securely on the foundation. The heavy-duty pumping unit was first leveled, and then aligned prior to grouting. Alignment was accomplished by removal of the pump head and actual checking of the uniformity of clearance between the rotor and casing with the head removed. The pumping unit and foundation were located as close to the source of supply as possible in order to hold the suction line loss to a minimum and also to prevent cavitation.

In order to prevent damage to the pump by entrance of foreign material, a 4 in. 20-mesh line strainer was installed in the suction line. Both the suction and discharge lines were fitted with short-length metallic flexible connectors. The purpose of these connectors was to eliminate pipe strain that would distort the pump casing while, at the same time, dampen any noise. As the range in temperature of the lubricating oil may vary from 70°F. up to 165°F. considerable expansion occurs in the piping. The bellows type connectors compensate for this expansion and keep the pump from being distorted. Additional support for the discharge piping is furnished by a steel bridge, as shown in Figure 2. Should the oil pressure at the engine drop below 55 psi, a pressure switch installed in the discharge port of the main circulating pump actuates the auxiliary pumping unit. If the main pump should stop for some reason, the auxiliary unit takes over and supplies ample lubricating oil to the engine, thus preventing engine damage. Check valves are installed in the discharge lines to keep the pressure switches functional and to prevent reverse pump rotation by fluid pressure from the operating pump.

While the pump was being broken in, the stuffing box was allowed to leak more than usual in order to properly seat the packing. As more operating hours were accumulated, the packing gland was gradually tightened until only enough liquid leaked out so as to properly lubricate the packing. The pump was equipped with a relief valve (mounted on the pump head) which was set at a pressure so as to assure prevention of any bypassing of liquid within the pump during normal pump operation. The valve in question is designed for pump protection only rather than flow control. In this installation a separate relief valve was provided in the line to act as a flow controller while the cold oil is circulating prior to the start-up of the 4,890 hp Enterprise engine.



◀ Fleet of International diesel crawler tractors—TD18's and 24's—clearing overflow on Indian lands after flood.

WORLD-WIDE DIESEL TRACTOR DEVELOPMENTS

By F. HAL HIGGINS

AUSTRALIAN Tractor Testing Committee has recently tested two Zetor diesel tractors from Czechoslovakia. The manufacturer is Zbrojovka Brno. Motokov (Czechoslovak Export Corporation) sent over the tractors. Rated horsepower under governor controls, drawbar on the test-track was 26 for the Zetor Super Diesel and 17 for the Zetor 25 A diesel.

M-R-S Manufacturing Company, Flora, Miss., is featuring its 200 tractor for its ability to turn 180 degrees without stopping. Powered by Cummins diesels, this line from the Mississippi levee country has been making its bid in heavy construction areas of the north since end of World War II.

One of the "melting pots" for world diesels is Italy, the 1957 La Meccanizzazione Agricola In Italia reveals. While the Italian Fiat leads all farm tractors in number, the British Fordson ranks second with about half as many. Among the US lines are Allis-Chalmers, Case, Caterpillar, International, Massey-Harris, Minneapolis-Moline and Oliver-Cletrac. Total of nearly 118,000 diesel tractors for farm are divided among many nationalities—British, French, German, Italian, Belgian and US.

The Carraro 25 diesel tractor is a small wheel model aimed at all farm jobs by the Italian manufacturer, Giovanni Carraro. But it's designer goes one step further than usually seen on this side the Atlantic in mounting a grain drill between

the rear wheels for easy on-and-off change-over with the planting seasons.

Huber-Warco's all purpose maintainer model M-52 is now available with Continental GD-157 diesel. The new model is equipped with torque converter by Fuller. This blade-under-tractor machine has added several attachments to make it one of the most versatile road and street machines on the market.

Yale & Towne, who have a western factory at San Leandro, Calif., have their tractor shovel in four models. The 404 is powered by GM 671 engine, and the smaller 104 is offered in either gas or diesel power. Both have Allison Torqmatic converter. Two models are offered with Hercules or GMC diesel.

Two "semi-diesels" are offered alongside its diesel and gasoline tractors by Landini & Figli of Italy. "The tractor using any type of fuel" in 30 and 44 hp sizes is a 1 cyl. job that the manufacturer claims has sold more than 25,000 units before 1958. The European semi-diesels were strong in entries at the famous Oxford trials in England about 1931, but had faded out of the picture in every country by World War II.

Tractor-pulled scrapers will build silos by scooping out trench, or horizontal pits for the storage of green roughage from now on if the US Department of Agriculture researchers are right.

Looser packing and greater spoilage as a result of not being able to pack and seal the stored feed as well as in the tall structures of concrete has held back the use of the trench silo except in the newer and poorer farming areas. Crawler diesels of International, Allis-Chalmers, Case, Deere, Oliver, and Cat have the advantage in both weight for packing the silage as it is put in the trench, but also in excavating the dirt in building the silo.

President Thornbrough of Massey-Ferguson on May 7, this year, drove the 1,200,000th Ferguson System tractor off the production line in Detroit. A complete new line of tractors has been developed with complete integration of policies, products and distribution for the world from the two companies brought together in 1953. The new 745 diesel tractor was one of the high spots at the Royal Show at Sydney, Australia. It rates 45.3 hp at the belt at 1650 rpm. Oliver, David Brown and Lanz diesel tractors were at the same show.

The Societe de Tracteurs & Motoculteurs Staub in France has brought out a 11 hp air-cooled diesel in which the front section is the tractor itself in which is incorporated engine, transmission, driving wheels, brake, seat and steering mechanism. The rear has two small wheels carrying toolbar, lifting and other controls. A horizontal pivoting arrangement gives complete independence of wheels.

West Germany has been sprouting new diesel tractors much like the U.S. did in gas tractors in World War I. There are 210 four wheel tractors, 69 two wheeled or garden tractors, and an even dozen crawler tractors for a total of close to 300 different makes. A growing demand for standardization to reduce the number of types and sizes to cover the demand is voiced by officials.

International Harvester Co. is expanding in Germany with the purchase of H. Fuchs Waggonfabrik A.G. at Heidelberg. The new works will



New Case-o-matic 800 tractor powered by Case diesel through Twin Disc torque converter. ➡

Called the Napco Crab, this new four-wheel drive tractor is powered by a Continental diesel with a Borg-Warner torque converter. Tractor recently placed on market by Napco Industries, Inc., Minneapolis. ➡

At work on a road building project in Southern Rhodesia is this Nuffield tractor powered with a Perkins P4TA diesel engine rated 41.5 hp at 2000 rpm. ➡

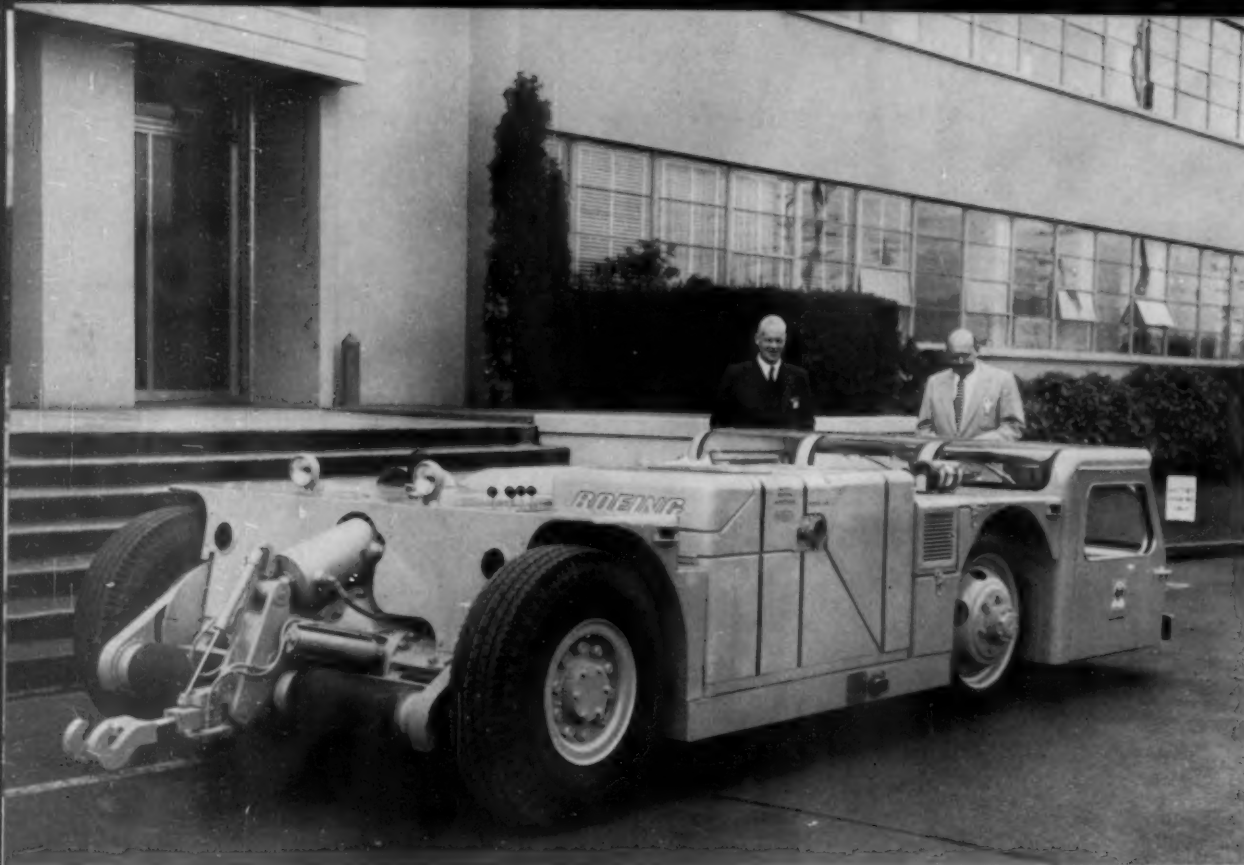
be a subsidiary of the old IHC works at Neuss where the company has been since 1908.

The German-built Lanz, now a subsidiary of Deere & Co., has announced its new DT model with 54 drawbar hp for the Australian market. It has 9 forward speeds and 3 reverse.

The Perkins line of British diesels are appearing all over the world in many different makes of tractors, combined harvesters and other farm and industrial machines and 70 per cent of the Perkins diesels are exported. Several U.S. companies with factories in Europe are equipping tractors and combines with this mass produced diesel that is now standard power in over 50 different makes of tractors and combines. A world wide demand for diesel engines since end of World War for farm machines has brought the big expansion of Perkins in the diesel engine field, says Peter Hooper of F. Perkins, Ltd. The Four 99 (TA) is the new 1958 Perkins model that is going into many combined harvesters of the self-propelled type as well as into small tractors. Perkins has been successfully tested for possible installation in Thermanius in Sweden; Epple-Buxbaum-Werke in Austria; Claas in Germany; Bernadin, Senor and S. Puzzi in the Argentina, as well as some nine other combines.

Renault, famed French automobile and tractor builder, powers its new model with a Perkins P3TA diesel rated 32 hp max. ➡





The Turbo-Tug is a new product of Napco Industries Inc. Minneapolis. Traction is provided by the basic weight of the airplane riding on its own landing gear, and motive force is transmitted through the roller-to-tire friction drive shown at the rear of the tug. Two Boeing gas turbines supply the necessary power.

The Turbo-Tug is shown here in position and ready to move a Boeing B-52 Stratofortress down the flight apron at Boeing Field, Seattle, Washington. The tug is coupled to the landing gear of the big swept-wing bomber and friction rollers at the rear of the tug rotate the airplane's wheels. Since the top of the tug's cab is only 49 inches off the ground, the tug can be driven easily under today's aircraft in order to make contact with the tires of the airplane.

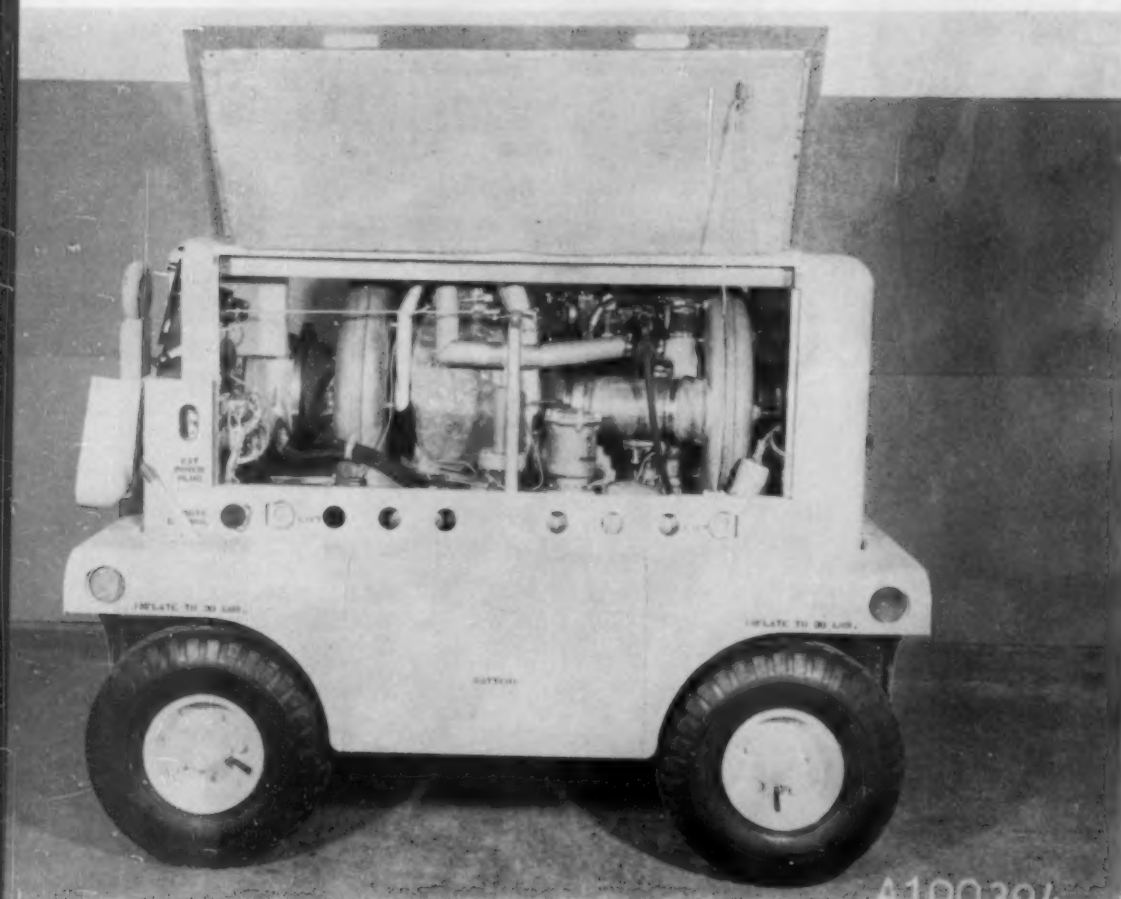
NEW CONCEPTS OF GAS TURBINE APPLICATION



VERSATILITY of gas turbine engines in the nonmilitary prime-mover field is evidenced by several applications recently announced by Boeing Airplane Company's Industrial Products Division at Seattle. Particularly noteworthy are those centered around use of specialized versions of the company's 502 series engines which range from 210 to 240 horsepower.

Most unique is the use of two turbine engines in an improved vehicle for towing aircraft called the Napco Turbo-Tug. A new product of Napco Industries, Inc. of Minneapolis, the Turbo-Tug solves the twin problem of moving large jet aircraft rapidly and efficiently to and from maintenance hangers, loading ramps and runways as well as starting their jet engines. In operation, the tug is driven under its own power to the airplane, coupled easily to the main landing gear, and the

The 502-11B gas turbine compressor is a specialized version of the Boeing 502 series of gas turbine engines and was designed to provide a large volume of compressed air for various applications. The 502-11B is the compressor counter part of the 240 hp 502-10C shaft engine. Compressor cart itself is based on Boeing's five years of ground support experience. Controls, including push-button starting, are fully automatic for operation at temperatures ranging from -65°F to 130°F.



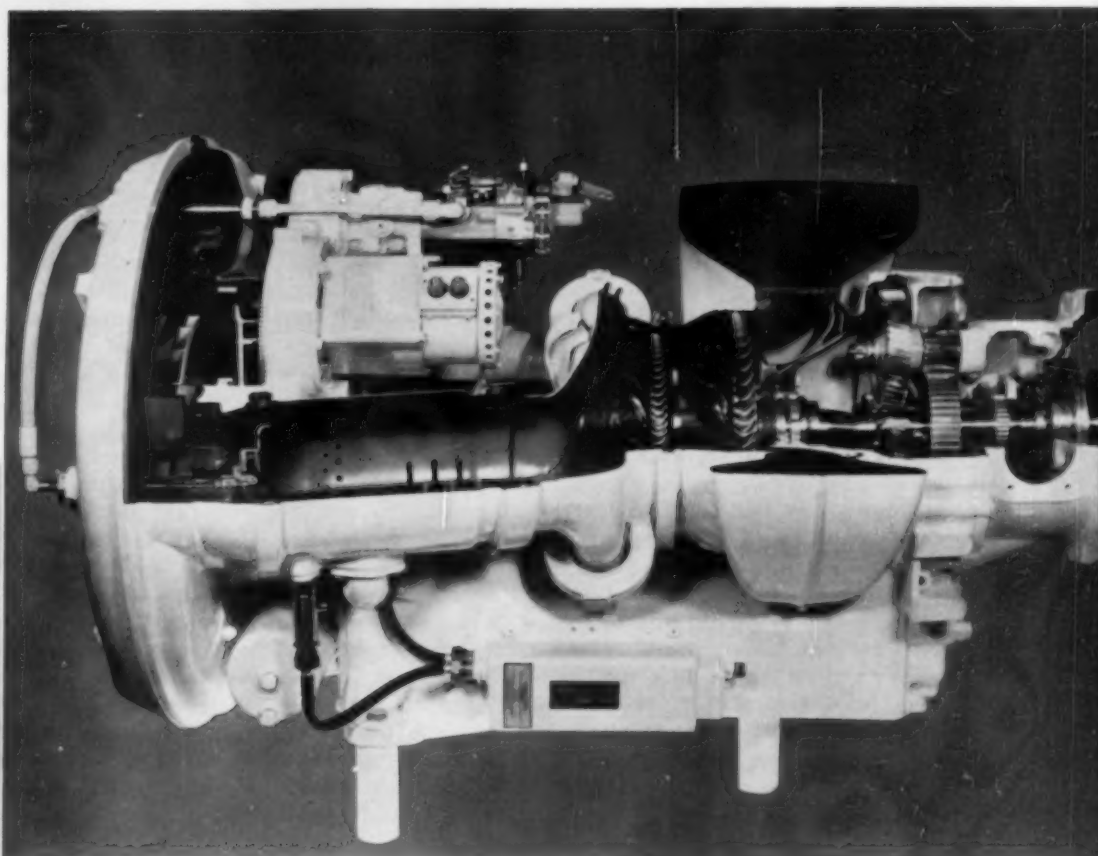
drive rollers are brought hydraulically into contact with the airplane's tires. Power from the tug's drive engine turns the rollers which in turn rotate the airplane's wheels and move it along the ground.

Advantages of the tug are many. The light weight—8,000 lbs. compared to 40,000 lbs. for the standard tractor—make it transportable easily by air. No heavy towing bar is necessary. Maintenance is simple, due to the extensive use of aircraft components in its construction. Jet engines of the airplane can be started by the tug itself without the need for an additional starter cart. Two small, light weight gas turbines supply the necessary power for driving the tug as well as generating the



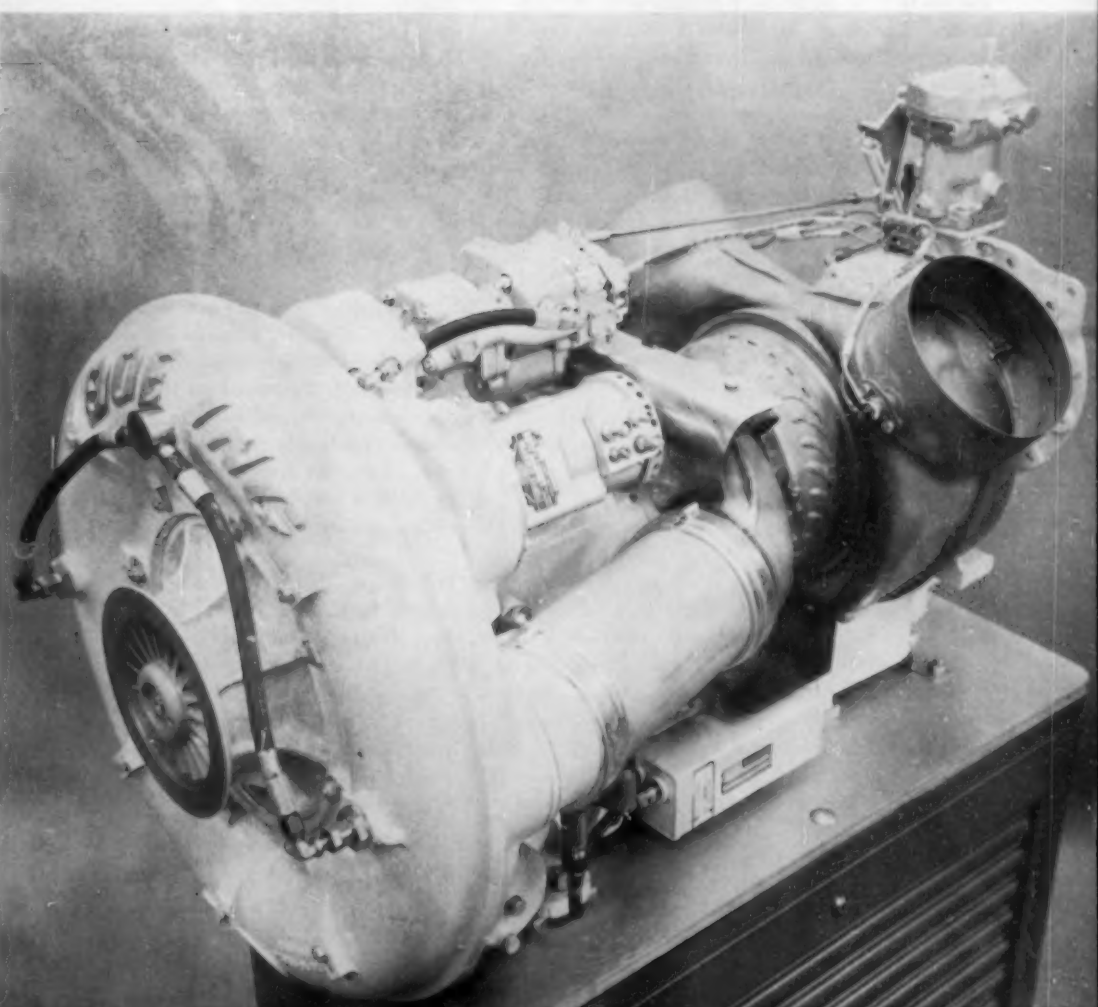
large volume of air for starting the jet engines of the plane. A Boeing 502-10C turbine engine drives the tug and a Boeing 502-11B supplies the starting air. Model 502-10C weighs only 320 lbs. and yet delivers 240 bhp under continuous operation. Model-11B, rated 210 air hp, is identical except that a single-stage centrifugal compressor replaces the reduction gear and output shaft in the drive unit. Both turbine engines operate at temperatures as low as minus 65 degrees F.

The model 502-11B turbine compressor used on the Turbo-Tug has also been designed by Boeing for portable use and is mounted on a four-wheeled cart. Built for rugged service, the compressor cart has individual suspension of the wheels for smooth towing up to 40 mph and the 80 gal. fuel tank permits a full day's operation without refueling. These gas turbine compressors are primarily designed for providing a large volume of compressed air for starting jet engines and checking pneumatic systems of large jet aircraft. They can also be used in air conditioning systems or for applications requiring the compression of relatively large amounts of gas. As in all 502 series engines, the 11B incorporates a free output turbine driving the output compressor. This allows the output compressor to operate independently of the gas producer compressor and simplifies the control system.



Latest version of the Boeing 502 series gas turbine engines is shown here in cutaway view. The 502-10C incorporates a free output turbine which results in an engine with a built-in torque converter. It is reported that improved compressor and turbine design gives a higher pressure ratio, a 25 per cent decrease in specific fuel consumption, and a 35 per cent increase in power compared with earlier models. Other features improve service life and simplify operation and maintenance are push-button starting, internal fuel and lubrication piping, and plain rotor bearings.

Eight Boeing 502-10C gas turbine engines such as this have been ordered by Creole Petroleum Corp. for installation on personnel boats for use on Lake Maracaibo, Venezuela. The engines each produce 240 bhp. Each 40 ft. Creole boat will be propelled by a pair of the Boeing engines and will cruise at 33.2 mph.



OCEAN-RACING AUXILIARY KETCH KAMALII

By JAMES JOSEPH

HER hand-sewn dacron sails set to pace the deep-water pack, the 75-ft auxiliary racing ketch *Kamalii* (pronounced: Kam-a-lie-ee) is every inch a princess (as her name implies in Hawaiian)—and perhaps the sleekest yacht ever to slide down Pacific coast ship ways.

The *Kamalii*, owned by Los Angeles' E. L. Doheny III, and built by Wilmington Boat Works, Inc. sleeps 10, carries a full-time skipper and scores a number of "firsts" among Class A ocean-racing yachts. Her main engine—a Mercedes-Benz 155-hp turbo-supercharged diesel working thru 2:1 reduction gears—is hushed by special hard-rubber vibration-isolation-mounts. The main engine, moreover, is installed slightly to port of the center line (as is her two-bladed, fixed pitch, 32x24-inch racing prop)—this to compensate for torque. The compensation is so complete that it neutralizes her natural tendency (with a right hand propeller) to fall off to port when under power.

A cast bronze centerboard, working thru a 2-inch slot in her lead keel, sharpens handling on windward tacks. *Kamalii's* laminated hull and trim lines surpassed even the expectations of her designer, famed naval architect Philip H. Rhodes (test-run under power over a measured mile, she clocked 9.4 knots).

Kamalii, nearly a year abuilding at Wilmington (Calif.) Boat Works, Inc., is 75 ft. 4 in. over all, has an 18 ft. 6 in. beam, a displacement of some 72-tons (including her 37,800-lb cast-lead keel). Above—and forward of the engine room—lies her dining saloon (air conditioned and installed with a built-in bar), fully equipped galley (with 13 cu. ft. of deep freezer and 15 cu. ft. of refrigeration), crew's bath and two berths. Aft of the saloon is a guest's state room, owner's state room and two bathrooms.

Capable of trans-ocean voyages, *Kamalii* is fitted with the latest navigational aids—including RCA radar (a 10-in. scope with range to 16-miles), Loran direction finder, fathometer, autopilot, radio telephone and magnetic compass. *Kamalii* carries a complete inventory of Watts sails (hand-sewn dacron and nylon). Typically, her mainsail is 12.5 ounce dacron, hand fitted with dacron rope and hand sewn with dacron thread (the sail's area: 1008 sq ft.).

When not under sail, *Kamalii* will run dieselize—powered by the 155 hp OM315A Mercedes-Benz main engine. Turbocharged and vibration-shock mounted, the diesel has a 505 cu. in. displacement, a 5½-in. stroke, a bore of 4⅞-in. The 6-cylinder engine (operating at 1800 rpm) works thru a ZF (Zahnradfabrik Friedrichshafen) electro-magnetic reverse and 2:1 reduction gear. In ahead and astern movement are two ZF electro-magnetic clutches. Internally, the gear box con-

sists of spur wheel trains for direct and counter rotation. Delivery is below the plane of the drive shaft (in *Kamalii's* case, the drive shaft is monel). Engine torque is transmitted either directly or through the reverse gear train to the delivery shaft, depending which clutch is engaged.

The ketch uses either of two interchangeable props. One, the racing prop, is the two-bladed, fixed-pitch unit. The other—her cruising prop—is the feathering type, three-bladed, and 32x22 inches. Both are manganese bronze. Electricity at sea (the ketch can be plugged into shore service while at berth) is supplied by a Mercedes-Benz OM 636 diesel (36 hp at 3000 rpm) directly connected to a Still generator, rated 11 kw, 110 volts dc at 2500 rpm. The auxiliary engine (similar to that powering the Mercedes-Benz diesel car) is 4-cylinder, liquid cooled, with a 107.8 cu inch displacement, a bore of 2⅞-in., a stroke of 3⅞-in. and a compression ratio of 19:1. Both engines are housed in a sound-isolated engine room which also mounts (1) 14 ship's service batteries, rated 112 volts, 215 amps; (2) two electrically-powered compressors serving the ketch's 28 cu. ft. of refrigeration (additionally, room units air condition the ship); (3) a La Marche battery charger.

Kamalii's engine room is among the most compact and modern in any racing craft. On one bulkhead, aft and above the main engine, is mounted the (1) main engine panel; (2) fuel meters (3) 17 valves which manifold fuel oil. The main panel mounts a 24-volt tachometer (duplicated on the bridge), an oil pressure gauge, water temperature meter, glow plug indicator and main generator charging indicator light. Below the engine panel lies the fuel-oil gauge board, monitoring *Kamalii's* four monel fuel tanks, two each side of the centerline aft of the engine room, with a total 700-gal. capacity.

Though both diesels are fresh-water cooled, their exhaust manifolding is cooled by seawater. Thus, the main engine's exhaust piping (copper) is double-walled. So, too, is its Maxim silencer. Engine exhaust air, cooled thru both piping and silencer, discharges aft thru a rubber exhaust pipe. Emergency shut-off alarms (audible and visual) monitor both engines' lube oil pressure, water temperature and speed.

The battery bank, providing 110 volts dc, is charged by a 5 kw generator belt-driven off the main engine. Two converters installed in the ship's service switchboard take power from the auxiliary diesel's generator—supplying ac to the *Kamalii's* electronic equipment. The same switchboard distributes to auxiliary pumps, the centerboard winch, autopilot and the main cabin's lighting panel. Provided is a combination electric-driven bilge, fire and flushing pump. Fresh water





OCTOBER 1958

41

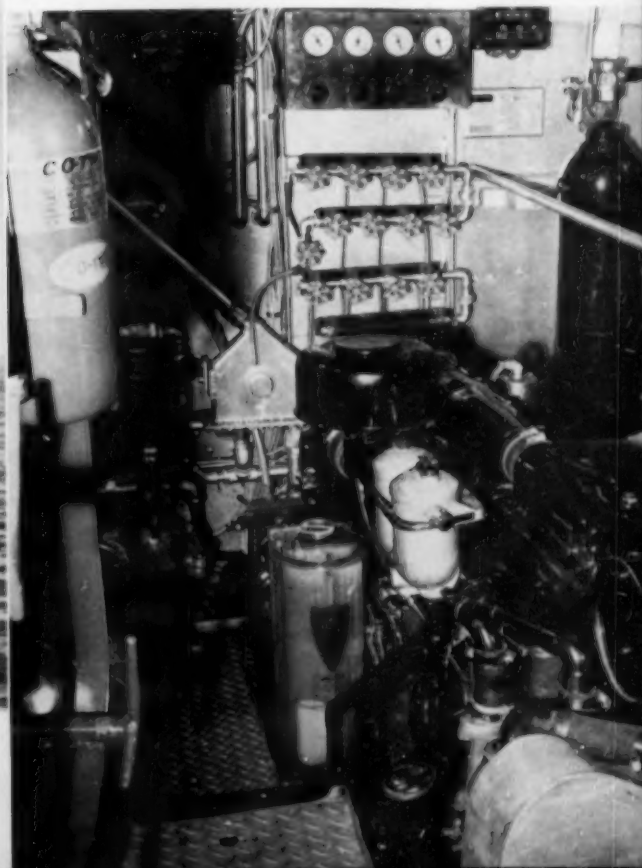
is supplied by an electric-driven pressure pump working with a 15-gal. monel pressure tank (615-gal. of fresh water are carried in three monel tanks located beneath the forward cabin floor). Mounted in the engine room is a 70-gal. monel lube oil tank.

Kamalii's steering system consists of a quadrant (monel) attached to a 2 $\frac{3}{4}$ -in. bronze rudder stock. To this are tied stainless steel tiller ropes. These are ferruled to the steering control console. The wheel can be disengaged thru a clutch. Thus, control is either manual (with clutch engaged) or automatic—thru the Bendix Autopilot. Insulation played its part in the designer's quest for quiet—both in the engine room and everywhere aboard ship. Thus, most below-deck bulkheads are double-faced—sandwiching styrofoam between douglas fir plywood. Engine room bulkheads are also insulated with styrofoam, both for noise and temperature control.

Typical of the custom work that went into the ketch was fabrication of the keel. The problem here was two-phased. The keel was to be of cast lead. It was also to be fabricated with a glass-smooth two-inch slot for the centerboard. First, a two piece laminated redwood mold was made—and lined with graphite and molasses (molasses, charring, would free the lead from the form). Next, the slot form—duplicating the dimensions of the centerboard slot—was fabricated from carbon. Lead pouring was continuous. Lead cool, the carbon slot-form was removed.

The *Kamalii's* engines were specially finished in baked automotive enamel (black), trimmed in chrome. Mercedes-Benz's diesel distributor for California-Arizona-Nevada, the In-Mar Co., rates the installation "one of our most successful . . . and certainly the handsomest on the Pacific coast."

Engine room showing the main Mercedes-Benz 155 hp turbocharged diesel on board the auxiliary ketch *Kamalii*.



HOW TO PREDICT TURBOCHARGED ENGINE PERFORMANCE WITH VARYING CONDITIONS

Extensive Research Results in Set of Reference Curves for Quickly Determining How Widely Varying Operating Conditions Will Effect Turbocharger-Engine Combinations

By RUDOLPH BIRMAN AND ERNEST W. BLATTNER*

MEASURING the performance of turbocharged internal combustion engines under shop and controlled field-test conditions provides much useful and valid data. Unfortunately, however, this data cannot always be used in trying to predict the performance of engine-turbocharger combinations under the widely varying operating conditions that exist in the field. For example, what happens when these units are transplanted from sea level to operation at 8000 ft. or anywhere in between? How will air temperature changes at compressor and engine inlets affect compressor operation? How would you predict the effects on

turbocharger rpm, flow delivery, pressure ratio and other characteristics when variables such as ambient temperature, atmospheric pressure, nozzle area and others change? The obvious course would be to conduct a general investigation of all the varying conditions likely to occur, in order to compile a reference of standard answers. In other words, one solution is to establish a set of curves that can be used to find out quickly how any given set of variables will affect turbocharger engine combinations.

This idea is by no means new. But the enormous

amount of time required and the costs involved in the vast amount of computation needed to work out these much-desired curves have long proved a stumbling block. Nevertheless, the engineering staff of the De Laval Steam Turbine company decided that the immense effort involved would pay off in terms of savings and convenience for all concerned and, of course, in greatly increased turbocharger efficiency in the field under various operating conditions. These curves were computed for turbochargers operating with two and four cycle diesel engines, and with the centrifugal compressor as the driven unit.

*De-Laval Steam Turbine Company

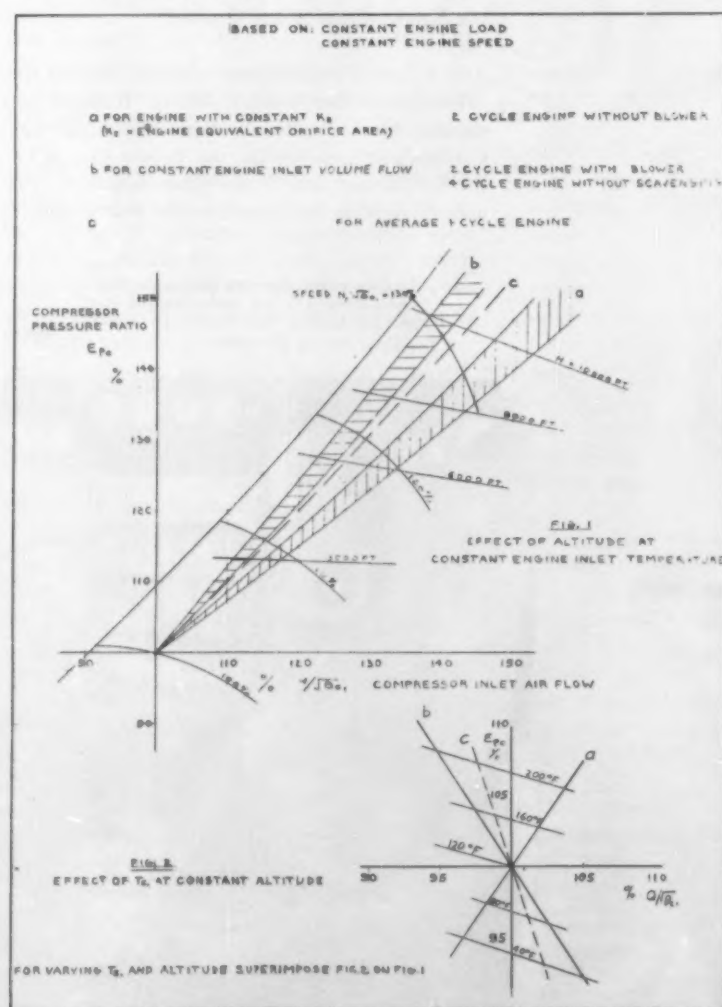


Figure 2—Analysis of effect of altitude on compressor operation.

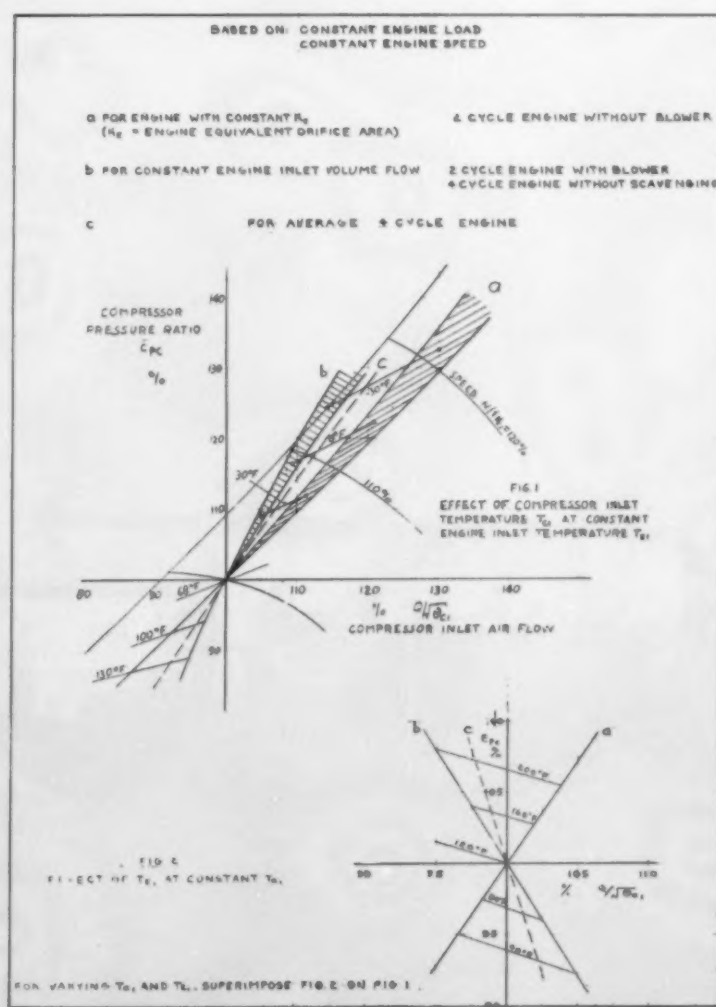


Figure 3—Analysis of effect of temperature at compressor and engine inlet on compressor operation.

The De Laval staff working on their project determined an analytical approach they considered valid, as well as certain assumptions on which their work was to be based. First of all, it was assumed that any turbocharger to be measured against the curves had been reasonably well matched to the engine; that is, the desired pressure ratio it would operate within the high efficiency range of the compressor, and not too close to the pulsation line. Next, it was understood that the use of computation to determine the effect of changes in operating conditions requires application of basic laws of flow balance and energy balance separately to the compressor, turbine, and engine. Thirdly, it was agreed that results should be presented, non-dimensionally in so far as possible, and in a manner applicable to a turbocharger of any flow capacity operating within a wide range of normal pressure ratios. For this reason it was decided that a change in any operating condition and its effect should be expressed as a percentage change, (δ). For example,

$$\delta P_{c_1} = \frac{P_{c_1} \text{ under changed conditions}}{\text{original } P_{c_1}}$$

$$\delta (Q\sqrt{\theta}) = \frac{Q\sqrt{\theta} \text{ under changed conditions}}{\text{original } Q\sqrt{\theta}}$$

These were the assumptions on which the analysis and computing were to proceed:

1. The turbocharger is well matched to the en-

gine for standard air conditions—i.e., the compressor operates at the proper pressure ratio within the high efficiency range, and well within its stable range.

2. The engine load remains constant.
3. The engine RPM remains constant.
4. The heat contained in the engine exhaust is a constant percentage of the fuel heat.
5. The turbine efficiency remains constant.
6. Pressure and temperature at various altitudes change in accordance with Figure 1.
7. Compressor inlet pressure, P_{c_1} , is always equal to the turbine exhaust pressure, P_{t_2} .

The vast amount of computing involved in working out the curves presented on these pages was accomplished by use of an electronic computer. The trial-and-error method was essential for solving the over-all problem, because equations describing compressor, engine, and turbine behavior are so numerous, and because several of the relationships cannot be written as equations but rather must be presented graphically. In other words, the effects of any new operating conditions, particularly those concerning turbocharger pressure ratio and flow, first had to be assumed and then either verified or corrected on the basis of all simultaneous equations and graphically.

What about test results which give a clue to the validity of these theoretical computations? First of all, it should be stressed that the theoretical

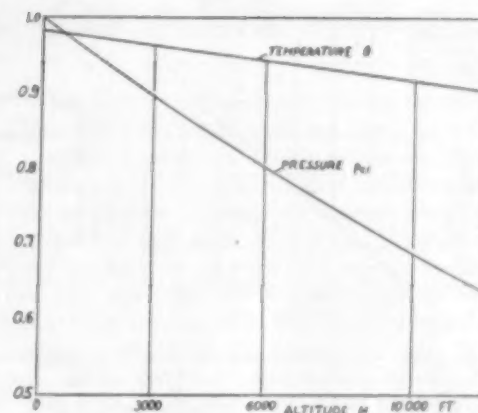


Figure 1—Variation of ambient pressure and temperature with altitude. Reference temperature 68°F=528°R and reference pressure 14.7 psia.

analysis was undertaken because even the engine manufacturer (who alone is in a position to explore these problems, for reasons of both time and money) could not possibly carry out the experimental work needed to obtain complete knowledge of the interaction of various turbocharger-engine combinations for the full possible range of guide vane settings, ambient temperatures, turbocharger inlet pressures, and inlet manifold temperatures. Nevertheless, the course of normal engine testing by manufacturers does provide fragmentary test results that can be used for comparison with the

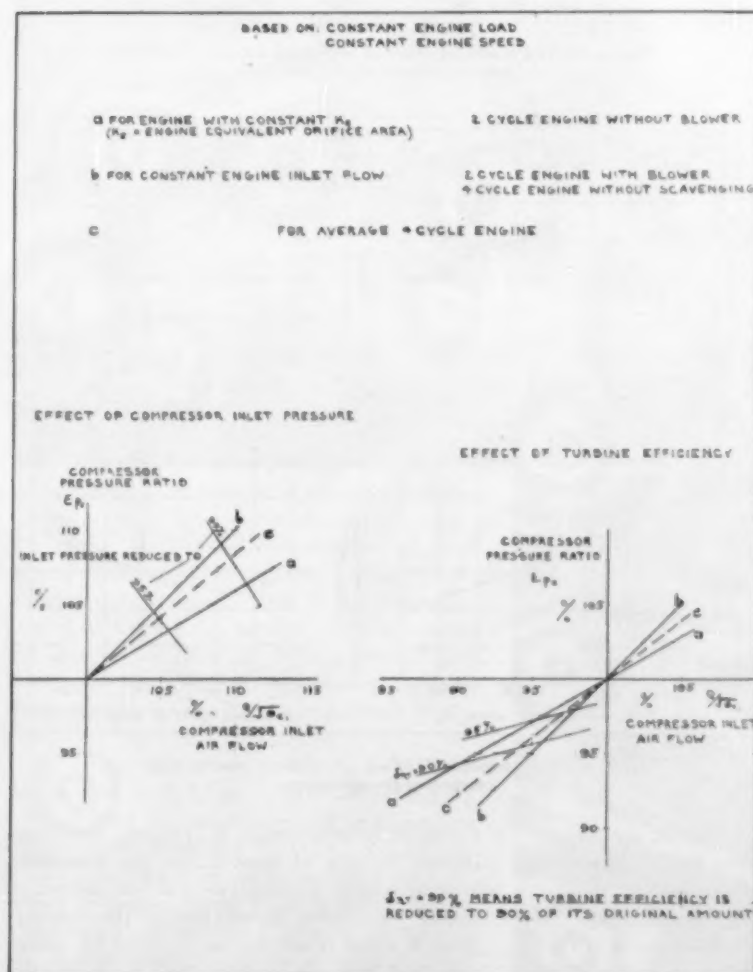


Figure 4—Analysis of effect of minor influences on compressor operation.

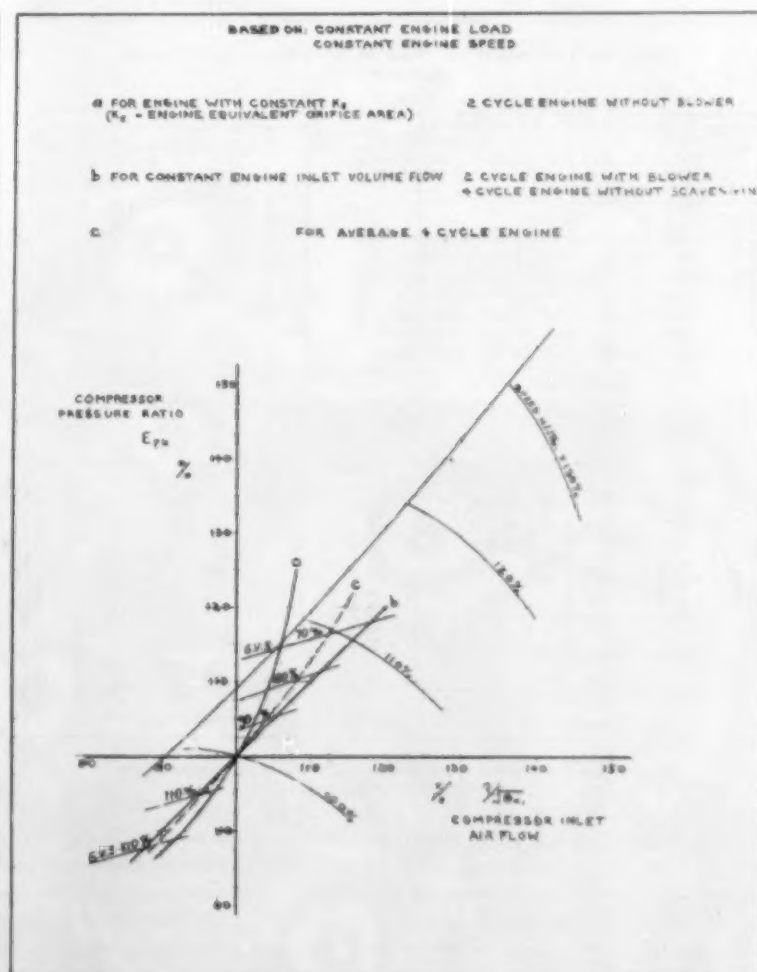


Figure 5—Analysis of effect of turbine nozzle area (G. V. S.) on compressor operation.

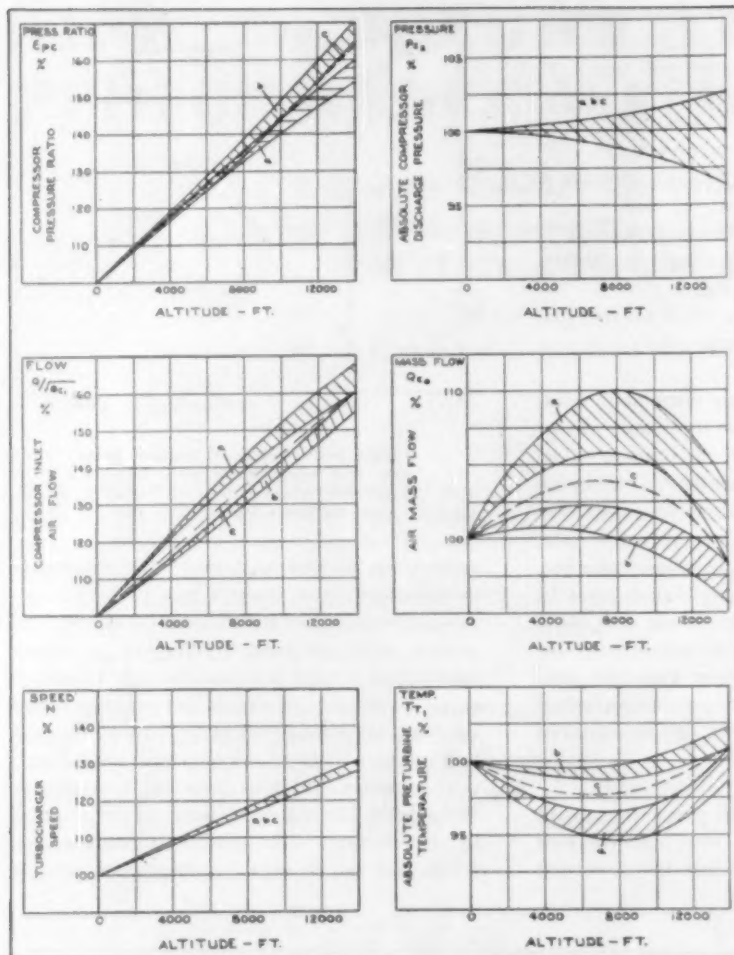


Figure 6—Test results of effect of altitude on turbocharger operation.

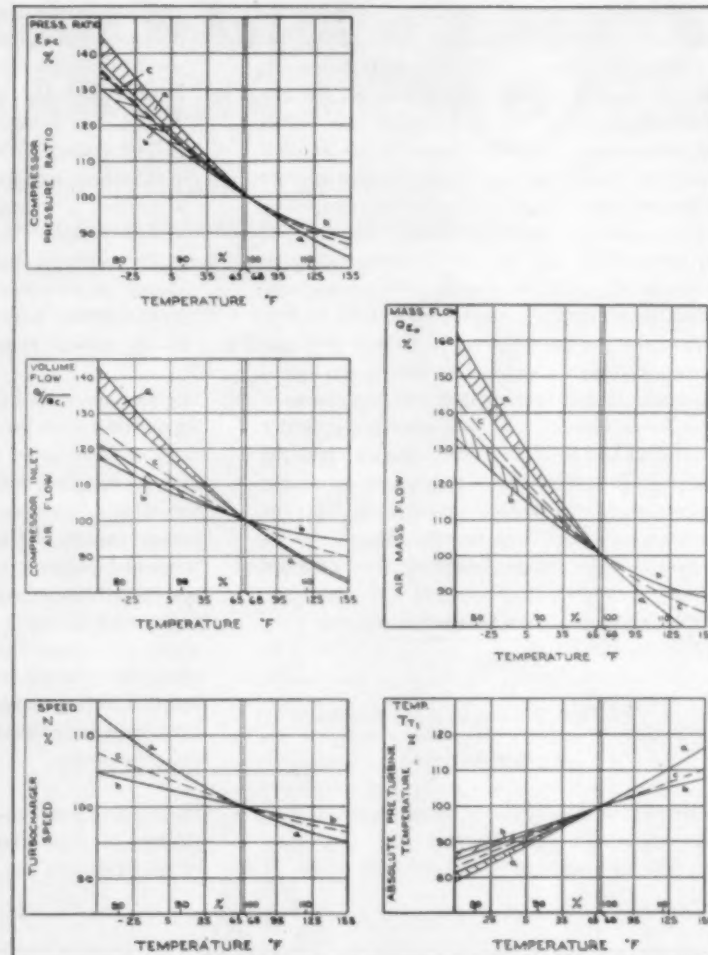


Figure 7—Test results of effect of air temperature at compressor inlet on turbocharger operation.

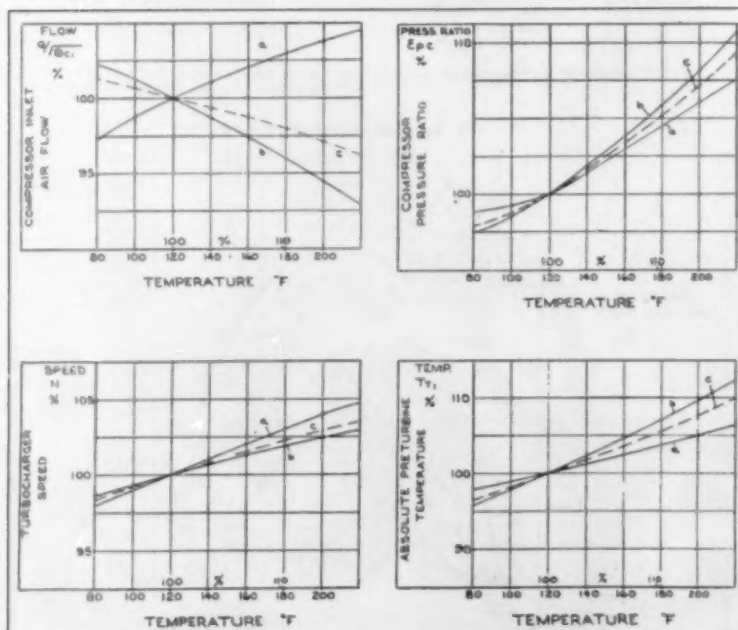


Figure 8—Test results of effect of engine inlet air temperature on turbocharger operation.

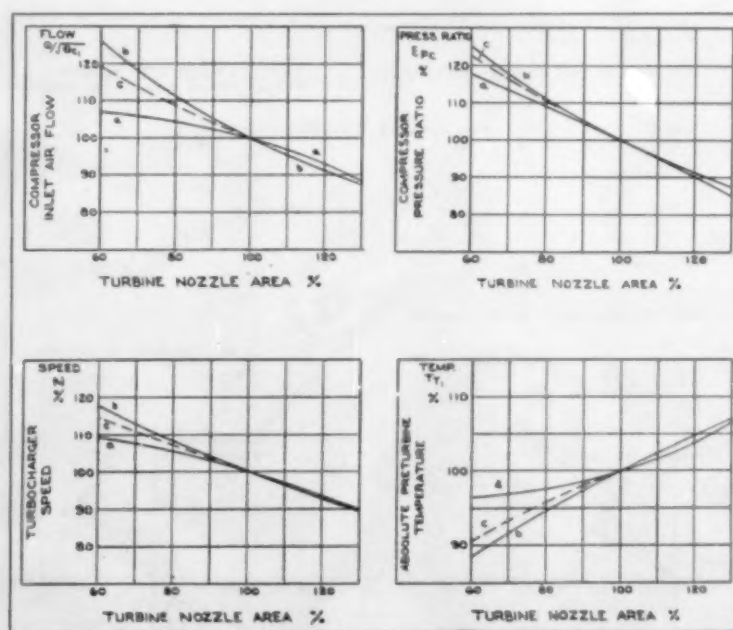


Figure 9—Test results of effect of turbine nozzle area on turbocharger operation.

theoretical computations. These results are shown as crosses on the corresponding curves of sheets. All the points plotted were obtained under conditions of constant engine inlet volume flow, and therefore are to be compared with the curves labeled "b". Note that the test results (Figures 6, 7, 8 & 9) agree reasonably well with the theoretical analysis results (Figures 2, 3, 4 & 5). The scatter of

the test points (which occurs even in tests of one particular engine) is probably due to measuring inaccuracy that is unavoidable in routine testing. Moreover, it must be remembered that certain simplifications were made for the purpose of this analysis, including assumption of constant turbine efficiency, disregard of any dynamic effects of the flow into, through, and out of the engine, and

variations in these effects as operating conditions change. In view of these factors the reasonably good agreement between practical and theoretical testing is gratifying. On the basis of the evidence, there is every reason to believe that the curves presented here are valuable tools for predicting the behavior of a turbocharger under varying operating conditions.

THE GAS TURBINE GOES TO SEA

Need for light, fleet and seaworthy boats for transporting personnel to and from offshore oil operations in the Gulf of Mexico off the coast of Texas and Louisiana has generated interest in a new source of prime power for these vessels. This interest was in evidence as Solar Aircraft Co. and Seward Seacraft, Inc. combined to produce and demonstrate the first gas turbine powered crewboat, *Jupiter*, to oil companies operating in the gulf coast area.

The *Jupiter*, a 55 ft. steel boat with 15 ft. beam, is powered by two 500 hp Solar gas turbines, model 522-J installed amidships. With a draft of 2 ft. 5 in., and turning two 32x38 in. propellers, the craft will accelerate from dead stop to full speed of 35 mph in 12 secs. The turbines, driving through a 17:1 reduction gear, step down their 20,000 rpm. speed to approximately 1200 rpm. at the propeller shaft, with a reversing gear providing full power astern without stopping the turbines. The Solar turbines powering the *Jupiter* are of the divided or two-shaft type, with a significant departure from the customary arrangement of the compressor and power ends of the turbine. Air is drawn into the compressor section near the center of the unit, and progresses forward through the compressor, the flow being reversed when maximum compression is reached so as to pass through

the fore and aft mooring lines are aboard. Supply of air to the compressor ends of the turbines is through twin draft tunnels built into the after end of the wheelhouse. Louvered and shielded by vertical panels, air is drawn in through these two tunnels, as well as from the forward end of the engine room and in this manner engine room ventilation is assured. A third louvered opening, communicating both with the pilot or wheelhouse and the deck immediately abaft it, permits the addition of air from either or both sources, and further aids in ventilation. Turbine exhaust, collected by the exhaust ring around the third-stage wheel, is led through an eductor nozzle within the tapered funnel, one for each turbine unit. The end of the eductor is carried upward past paired louvered openings into the stack, so that the exhaust gases, issuing from the nozzle, draw fresh air into the stack, maintaining it at near circumambient temperatures. This method of cooling also helps to dampen the sound of the exhaust gases and make the *Jupiter* as quiet—so far as decibels go—as a diesel-powered vessel. The noise, however, is of a different quality, being rather high-pitched. This is particularly noticeable at starting. The sound of the air through the compressor becoming less apparent once full power is developed.

The *Jupiter*, while fully equipped and ready to go

to sea, had in the engineroom little of the noise-suppressing equipment which has been found desirable on pipeline gas turbine installations. Once the turbine is silenced by adequate shrouding, and the contours of the intake air passages altered to smooth out air flow, the *Jupiter* type of crew boat can be made as quiet as the earlier naphtha launches of a bygone era. The gas-turbine powered crew boat requires only some 4,400 pounds of prime mover for a 1000 horsepower craft. The gas turbine will burn a wide variety of fuels, including kerosene, diesel fuel, and jet fuel. With a fuel capacity of 600 gallons, the craft has a cruising range of about 16 hr. at 35 mph.

Equipped with 16 bus-type seats in the after cabin, the *Jupiter* carries as many as 25 on offshore trips, with living quarters forward of pilothouse providing crew quarters, galley and head. Generators driven from the turbine stub shaft provide for normal lighting, signalling and other current, with 24 volt storage batteries, trickle-charged from the generator leads, providing stand-by current for lighting and for starting the turbines. To lessen the load on the batteries, the turbines are started one at a time, the second being kicked off as soon as the first unit has attained full idling speed. The *Jupiter* can be handled by one man, with engine controls brought in the conventional manner to the wheelhouse. Full power astern instantly makes the craft extremely serviceable in close quarters, or when making fast to a drilling rig or other offshore structure with a running sea.



◀ *Jupiter* underway powered by Twin 500 hp Solar gas turbine engines. Funnels amid ships exhaust turbine gases and an air through louvered openings to aid in silencing the exhaust.

Close-up of the starboard gas turbine showing the exhaust housing over the power turbine, the 17:1 reduction gear, and the Capital reversing gear. Compressor section of turbine is forward, as is the air intake. The downstream end of the combustion chamber is shown protected by mesh guard.

the combustion chamber in a direction opposite to that taken by the air through the compressor. The turbine is three-stage, with the first two stages driving the compressor shaft, and the third, on a separate shaft, drives the shaft to the gear reduction unit. Use of the two-shaft turbine permits the speed of the turbine to be controlled over wide limits by varying the fuel feed to the unit, while permitting maximum compression of the combustion air to the burner.

As mounted in the *Jupiter*, each turbine is fully self-contained, and may be started and operated independently. Starting is by means of a 24 volt battery-powered electric motor, mounted atop the front end housing. When proper speed air volume is attained, the firing cycle is initiated, after which the turbine rapidly comes up to speed. Starting of the *Jupiter* from a cold berth can be accomplished and the craft under power by the time



PIPE-LAYING BARGE

L. E. MINOR

By MICHAEL T. PATE

AS drilling for oil and gas pushes ever outward in the Gulf of Mexico and the problems of the driller lead to bigger and bigger equipment, the pipeline contractor finds that he, too, must enlarge his equipment to be able to withstand the effects of greater wave action and to successfully lower the heavy pipe to its resting place without overstressing it or spalling off its protective coating of cement and anticorrosion coverings.

Brown & Root, Inc., of Houston, long active in laying pipelines in deep water, have just commissioned their newest pipe-laying barge, the *L. E. Minor*, which is designed to work in as deep water as platforms can be maintained in, and to lay the large diameter pipe required for oil and gas production from offshore wells. The *Minor* is 350 feet in length, with a beam of 60 feet, and a molded depth of 22½ ft. Normally loaded, she draws about 10 ft, the draft varying with the amount of pipe aboard and whether the barge is being used for applying Timcoat. Timcoat is used in lieu of the concrete to obtain the requisite negative buoyancy to maintain the pipe in its trench at the floor of the Gulf.

The barge is powered throughout with diesels. Three Model D397 Caterpillar diesels, each rated at 505 hp at 1200 rpm furnish the electric power required for the welding equipment and operating the eight anchor winches. The D397's are turbocharged, of 12-cylinder design, and rated for continuous operation. The electric generating hook-up is unique. Two of the diesels are connected to Columbia marine generators, each rated 350 kw, at

60 cycles and 480 volts. Direct coupled to the extended shaft of each of these generators is a Westinghouse dc generator, rated 250 kw at 240 volts. The third Caterpillar is connected only to a Columbia ac generator with the same rating and characteristics as the other two.

Power requirements on the barge are such that dc current is used only at intervals determined by the pipelaying program. Alternating current, on the other hand, is used for the all-electric galley and for the air-conditioning units which cool the vessel below the main deck wherever personnel must work. It is also led to each of the welding stations on the firing line where it is converted by means of Vickers 400 amp. rectifiers to direct current for the welders. When the two units with dual generators are in operation, one may be used to provide the alternating current while the other powers the direct-current anchor winches. If either of these diesels is down for any reason, the third unit, having an ac generator only, is used for that service, leaving the other diesel free to provide power for the anchor handling.

The gantry crane which spans the main deck and travels on special rails from one end of the barge to the transfer rack at the other is a marked departure from normal pipe-laying barge practice, which includes one or more sideboom tractors for handling pipe to the firing line rollers. The gantry, driven by two motors, one mounted on each horizontal side frame member, has an 50 ton capacity, and is normally operated with a 100 ft boom, which gives it span well over the side of the barge. Power for the gantry itself is through an NHR56B1 300 hp Cummins diesel, mounted in the Manitowoc crane riding the apex of the gantry. Drive is through a Twin Disc torque converter, providing exact control of both revolution and load handling. The gantry is moved up and down the track by a pair of racks mounted on the deck adjacent to two T-head rails. Chain-driven

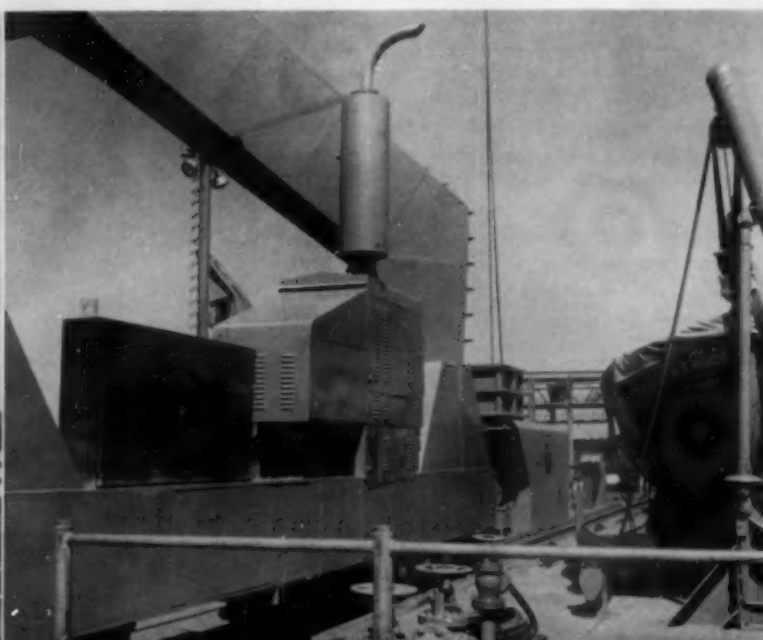


pinions mesh with the rack and move the unit. Power is through a pair of motors, one on each frame, controlled from the cab of the gantry. Power is generated by a separate unit, to make the gantry entirely free of current connection to the barge and to enable the unit to be shifted as desired. Housed on one of the side horizontal gantry members is a model MD318 Caterpillar, with turbocharger, direct-connected to a dc generator. The diesel is controlled by current requirements, and is fueled from a tank built into the gantry leg adjacent to the engine housing.

The gantry which traverses the barge provides means for handling pipe and other supplies aboard the barge, as well as placing pipe on the transverse feed rails from the storage space in the hold. Power for the Manitowoc crane atop the gantry is supplied by a 300 hp Cummins equipped with a Twin Disc torque converter.

A completely housed turbocharged Caterpillar engine provides power for moving the gantry along its track. Two motors, one on each horizontal gantry member, are controlled from the cab atop the structure.

46





The all-electric galley and bakery are powered from the barge's generating system, as are the ac motors operating the air-conditioning units, the concrete mixer for joining pipe coating at welds, and the pipe transfer rack at the bow end of the barge. Direct-current motors power the five davits which, through chain lifts, place the pipe in its carriers during the welding operation. These davits are powerful enough to lower the entire 350 ft of pipe over the side and to the bottom in case an oncoming storm makes it desirable to cut loose

A General Motors model 4-71 diesel drives the Chicago Pneumatic air compressor that supplies starting air, and air for the pneumatic controls aboard the barge. Radiator for the compressor intercooler and surge tank for the skin cooling system are at the right.

Bow view of the *L. E. Minor*, showing the welding stations, the shelter for the X-Ray unit and the joint coater. The twin pipes alongside the barge are the "stinger" used to ease the pipe to its resting place at the depth of 100 ft or more.

Controls for the eight anchor winches are centered in this conning tower. They enable the operator to pay out or heave in on any of the anchors as required to maintain barge alignment or move ahead as pipe is laid.

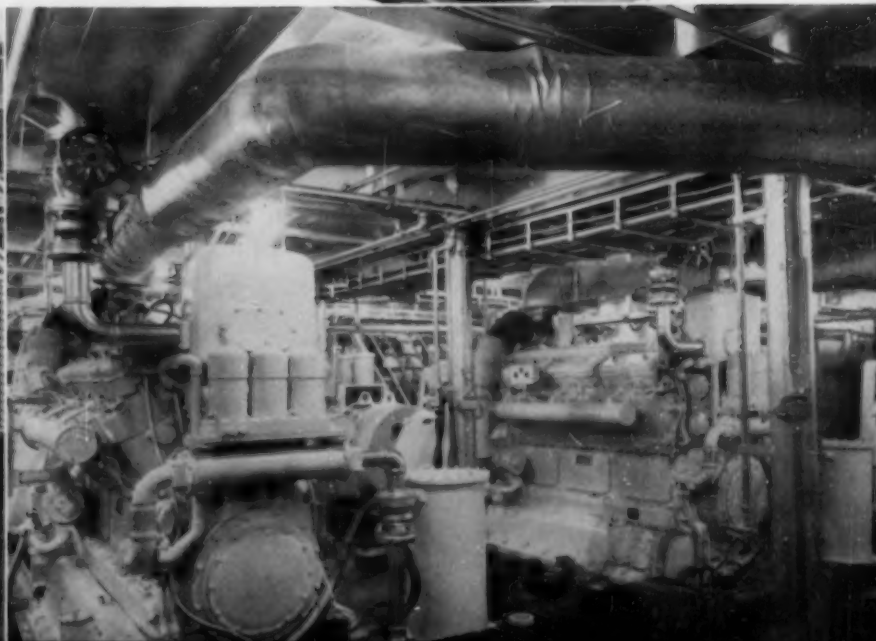
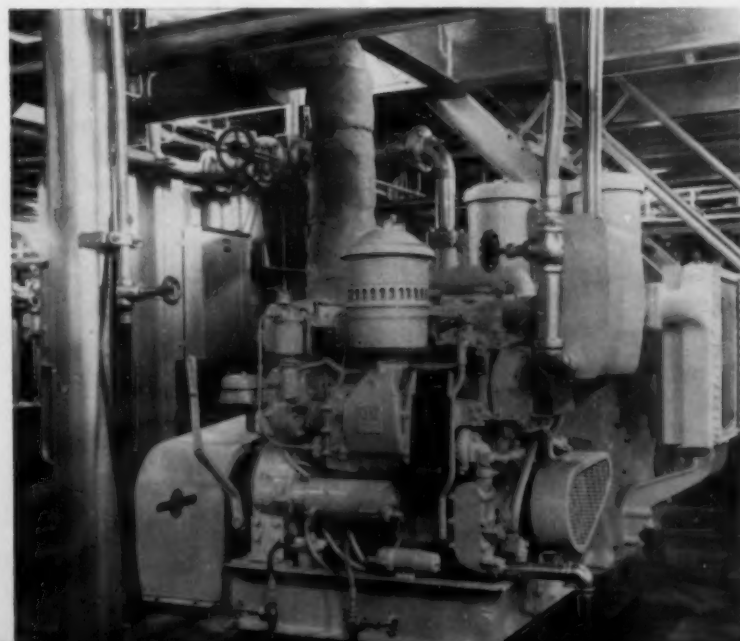
Two of the three D397 Caterpillar diesels that furnish main power to the *L. E. Minor*. The generator end of the third unit is visible to the right.

from the pipe and move the barge to a sheltered port. The pipe supports, located along the firing line from the transfer rack to the spot where the completed line enters the water, are carried on hydraulic plungers which may be positioned to attain the desired pipe slope, after which they are locked in place to prevent shifting. With quarters for 88 men, two 52 ft x 12 ft x 19 ft diesel fuel tanks providing a nominal total fuel capacity of 166,000 gal., and with ample provision storage space, the barge has sufficient pipe storage capacity in the dual holds to enable it to work ahead when weather is too rough to permit transfer of men or stores, but not too rough to prevent continuation of the welding and lowering operations.

Because the barge is not provided with power for moving, other than that obtained by shifting within the scope of its anchors, it must have tugs for moving from port to location. Then, barring unfavorable weather, it is equipped, powered and manned to see the contract through without returning to port.



47



FILTRATION OF DIESEL ENGINE OILS

By JOHN R. MCCOY*

FILTRATION of the lubricating oil of an engine is very important from an engine maintenance standpoint. The main function of an engine oil filter is to reduce wear, maintenance, and down time. Oil savings is secondary but can amount to a sizable item. Size or horsepower of the engine, type of bearings used, severity of the engine operation, type of oil, and type of fuel all influence the type and size of filter that should be used and its method of installation. Lubricating oil must be clean to perform its given function and the proper use of filters can reduce engine wear to a fraction of what it is without filters. Maintenance, down time, and oil changes can be greatly reduced. Increased power and more efficiently operating engines will result.

Filters may use many types of media, both inert and adsorbent. Each type has a very definite place. Inert-type filters are normally recommended where additive-type oils are used. Their principal function is to remove abrasive solids and soot. Where straight mineral oils are used, fuller's-earth type filters are practically always recommended. Fuller's earth filters not only remove solids but dissolve contaminants such as acids, asphaltene, etc., as well. The main factors to consider when selecting and sizing a filter are the amount of contamination that will get into the oil, the flow rate of the oil, and the oil sump capacity. The amount of contamination that will occur in a lubricating oil system is directly related to the horsepower, type of fuel, and type of operation. Particle-size-removal ratings of filters are highly questionable. There is

no standard method of testing filters for particle-size-removal ratings. Accurate comparisons of ratings assigned to filters by different manufacturers cannot be made because of the many variations in testing procedures and methods of assigning ratings.

There are four commonly used methods of installing oil filters on engines: by-pass or bleeder (Fig. 1); shunt (Fig. 2); full-flow (Fig. 3) and utilizing an auxiliary pump and motor (Fig. 4). Each method has its advantages and disadvantages. By-pass-type filters actually operate by bleeding a small amount of the oil from the main pressure line of the engine, through the filter and discharge into the sump. By-pass-type filters are usually highly efficient and will remove a high percentage of the small particles in the neighborhood of 3 to 4 microns in one pass. Flow rate through a by-pass-type filter usually ranges from 5 to 10 per cent of the flow rate of the lubricating oil going to the engine. When cartridge-type filters are used, it is usually necessary to control filter flow rate with an orifice. Where large bulk-type filters are used, no orifice is necessary.

Shunt-type filters are usually of the same general

construction as by-pass-type filters. Elements are high density, high efficiency elements. In this method of installation, part of the oil goes through the filter and part of the oil goes around the filter. Both the unfiltered and the filtered oil flow to the main oil gallery. A restriction is placed in the main oil line so that part of the oil will be shunted through the filter. This restriction may be an orifice or a pressure control valve. Full-flow filters are designed to take the entire flow rate of the oil. Both engine flow rate and contamination must be considered when selecting full-flow filters. Flow rates vary considerably from builder to builder for comparable sized engines. Full-flow filters must be sized to handle the dirt load as well as the flow rate. The filter is located directly in the main oil line. The filter shell itself is designed with large inlets and outlets and standpipes so as to restrict the oil flow as little as possible. It is good practice to install a by-pass line around the filter and this is equipped with a pressure relief valve. When the elements become loaded, the pressure relief valve will open and allow oil to flow and thus prevent

*Manager of Technical Service, Indiana Commercial Filters Corporation, Lebanon, Indiana.

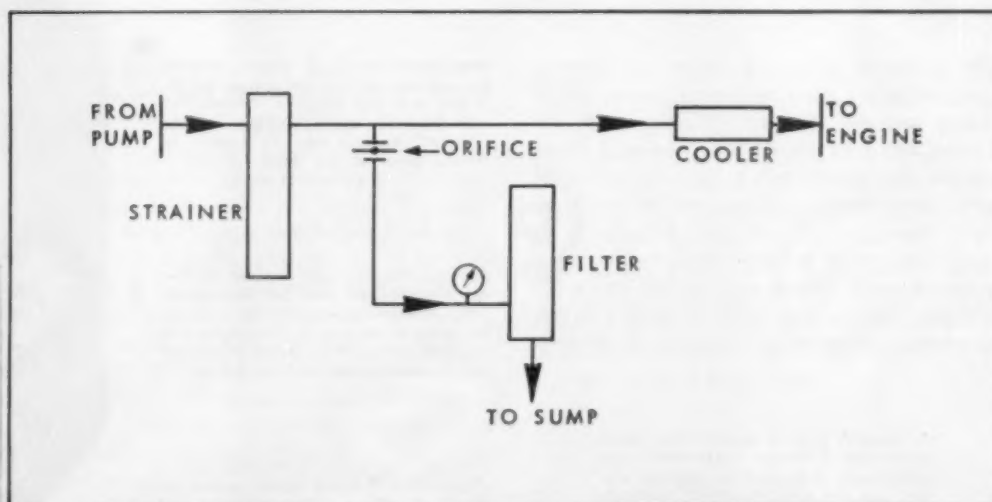
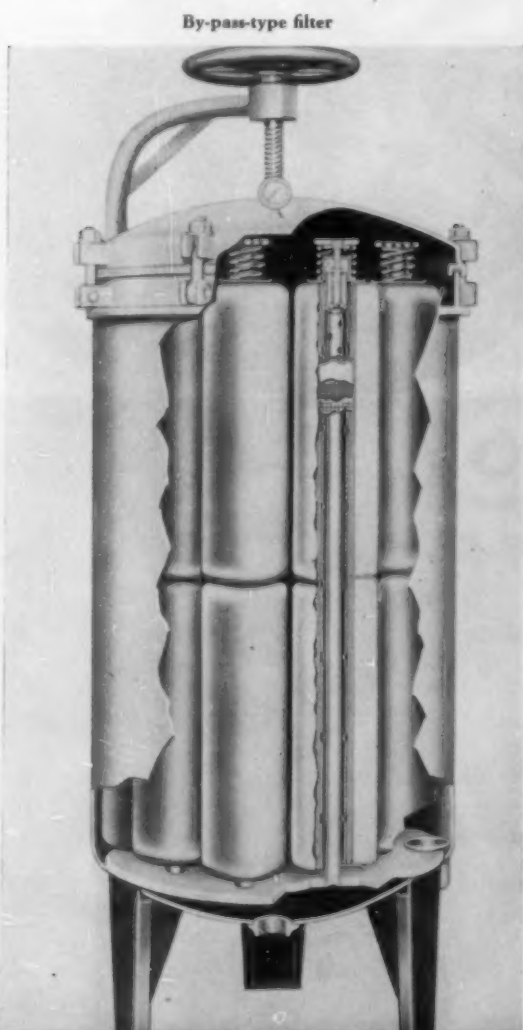


Figure 1—By-pass-type installation

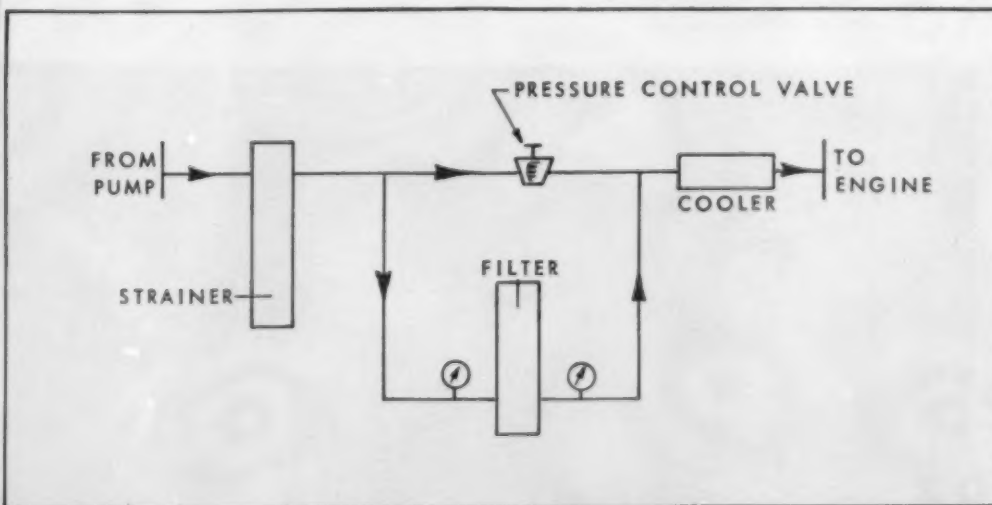


Figure 2—Shunt type installation

robbing the engine of oil. It is the belief of the author that external relief valves are more satisfactory than internal relief valves. It is possible for high flowing oil to wash dirt from the loaded filter cartridges through an internal relief valve and then to the bearings. Any contaminants washed from filter cartridges will have become agglomerated and consequently can cause much greater abrasive wear to the lubricated parts of the engine than if it had never been removed by the filter. The cost of external relief valves is usually higher than for internal relief valves, but the increased protection to the engine is well worth the difference everything considered.

Where large stationary engines are employed, auxiliary pumps are quite frequently used to circulate the oil through the filter. Where this method of circulation is employed, highly efficient filters of the by-pass type are used. Oil is picked up from the sump of the engine by the auxiliary pump, passed through the filter and is discharged back into the sump. This method of operation is, by far, the best method where by-pass-type filters are used on large stationary type engines. With this method, the filter operates completely independent of the engine—even when the engine is not running, if desired. This is a distinct advantage with intermittent or erratically operating engines which may cause the oil to become extremely dirty at times. The filter can clean up the oil while the engine is not running. Full filter element life

can be obtained. On large stationary engines, by-pass-type filter elements are normally changed when the pressure drop across the filter reaches a desired level. This desired pressure drop always can be reached when auxiliary pumps are used. On some engines, oil pressure is lower than the maximum recommended pressure for changing refills; consequently, full life of the filter elements cannot be obtained when using a straight-by-pass-type installation. Best filtration practice dictates that oil flow to the filter should be continuous and steady without changes in flow rate or pressure. This can be obtained quite easily with an auxiliary pump and motor.

The conditions under which the engine operates should determine to a large extent the type of filter to employ. Some engines operate in a very dirty atmosphere such as on earth-moving machines, near rock crushers, in cement plants, etc. In spite of all precautions which may be taken, this highly abrasive dust will enter the engine and cause abrasive wear if it is allowed to circulate through the engine in the lubricating oil. In this case, it is imperative that the abrasive dust be removed as quickly as possible from the oil. This can be done the quickest with full-flow-type filters. Slow-speed engines operating in a clean atmosphere such as on a river boat in the middle of the Mississippi River would have an entirely different problem than that of the earth-moving machine. The principal solid entering the oil in this

engine would be blow-by carbon, and very few abrasive particles would be present. A by-pass filter, in this case, probably would do a better job of keeping the oil free of blow-by carbon than a full-flow filter, and it would not be necessary to filter the oil each time it goes to the bearings.

This business of filtration is a matter of compromises just the same as with any other type of equipment. Particle size removal, flow rate, pressure drop, dirt-holding capacity, and size are all very closely related. One or more of these characteristics must be compromised to obtain maximum performance with the other characteristics. It is desirable that both full-flow and by-pass-type filters be installed on the same engine. With this type of operation, the engine will be protected at all times from abrasive particles, and the oil will remain in a much better condition than can possibly be obtained with a single installation. On large stationary engines, it is possible to install a filter in many places in the oil system. The best place is immediately following the main pressure pump where the oil flow is constant and not fluctuating and where the stream is solid oil and not mixed with air. Scavenging pumps pump part oil and part air. If oil coolers are installed in the line beyond the main pressure pump, then the filter should be installed in the line before the oil passes through the cooler. Hot oil is thinner than cold oil and consequently will cause less pressure drop through a filter. A low-viscosity oil will give up its dirt easier than a high viscosity oil; consequently, the filter will perform better if installed where the oil is the hottest because it is the thinnest at that point.

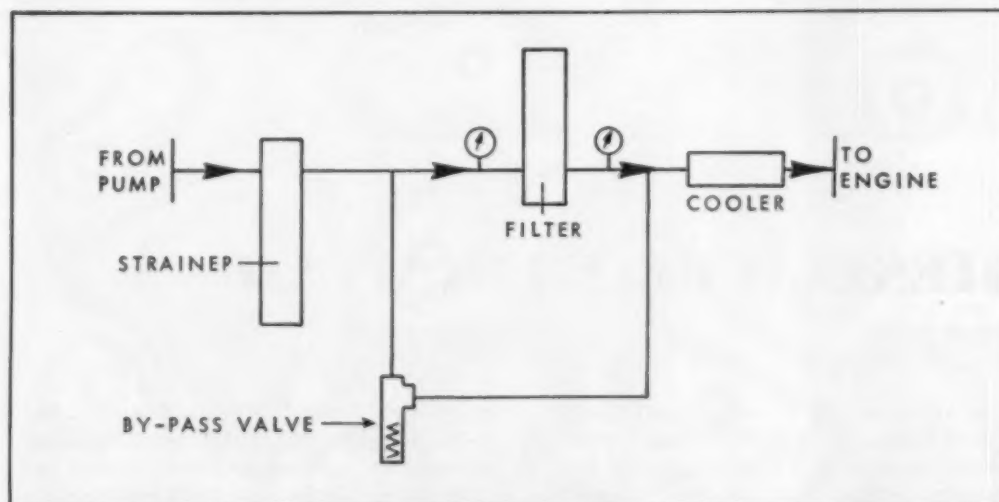


Figure 3—Full-flow installation

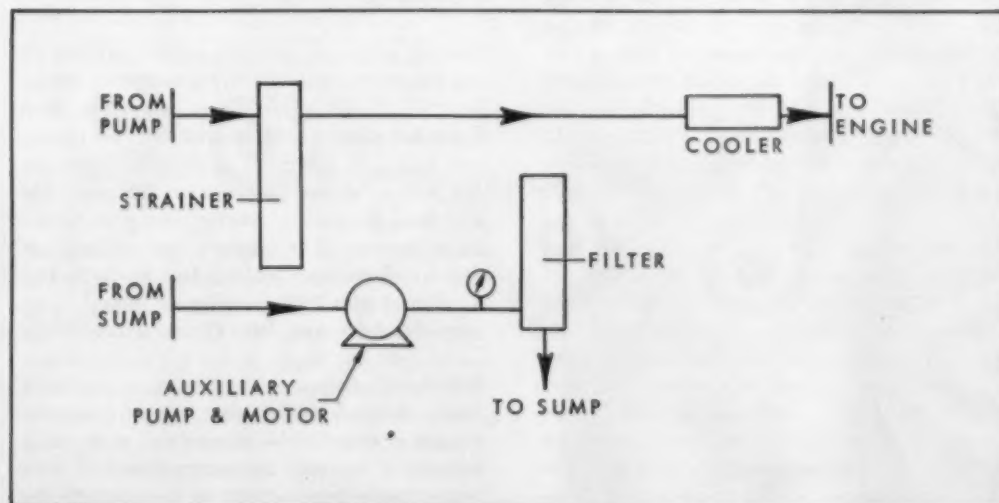
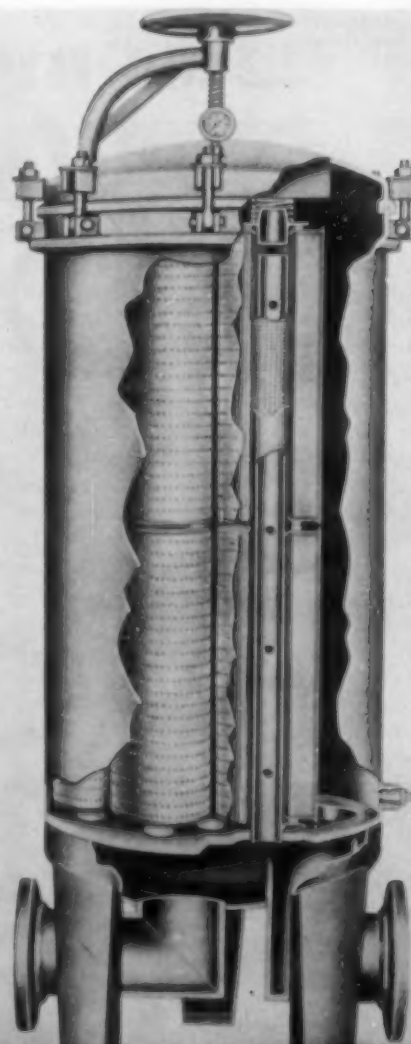


Figure 4—Installation using auxiliary pump and motor

Full-flow-type filter





2400 HP DIESEL TUG SAVANNAH

NEW Orleans—the tugboat *Savannah*, one of the most powerful in its class in the world and the largest ever built in the Louisiana area, was recently commissioned in ceremonies by the Atlantic Towing Company. The Tug, designed and built by Equitable Equipment Company was christened with Savannah River water by Mrs. Frank W. Spencer, the wife of Captain Spencer, General Manager and Treasurer of Atlantic Towing Company. Miss Cecile Dix of Savannah, Georgia was the Maid of Honor. Speaking at the commissioning were Captain Spencer; W. P. Oster, vice president of Equitable Equipment Company, and Ted Gupton, District Sales Manager of Alco Products, Inc., supplier of the *Savannah's* main-propulsion equipment. Following the ceremonies the guests attended a reception at the International House.

The 2400-hp *Savannah* will operate in Savannah harbor and along the Atlantic coast. A versatile boat of all-round utility, she is designed to tow barges, dock ships, and perform ocean or coast-wise towing. She joins four other tugs operated by Atlantic Towing, which has its headquarters in Savannah. The new tugboat is one of the largest

of its type to enter the service of Atlantic Towing. It has a cruising speed of 13 knots and a cruising radius of approximately 3500 miles at eight knots. Designed and built by the Equitable Equipment Company, the tugboat draws 13 ft., has a beam molded of 27 ft. and is 14 ft., 8-in. deep at the side amidships. It can carry 42,000 gals. of fuel oil, 4,500 gals. of fresh water and 400 gals. of lube oil. The 105 ft. tug is the largest of Equitable's standard tugs. The remainder of the Equity line includes 45, 55, 65, 85 ft. tugs; 32, 39 and 51 ft. water taxis, workboat tenders, supply vessels and drilling tenders.

The tugboat's main propulsion is supplied by a 16-cyl Vee-type, turbocharged and aftercooled marine diesel engine manufactured by Alco Products, Inc. The diesel engine is rated at 2100-hp at 1000 rpm for continuous duty and 2400-hp in emergency operation. A four-cycle unit, it has 9-in. bore, 10½ in. stroke and weighs approximately 43,500 lbs dry. It is the largest of the three sizes of the model 251 series manufactured by Alco and is identical with high-power marine diesels previously installed aboard the tugboats *Kings Point* and *Fells*

Point by the Curtis Bay Towing Company. Alco model 251's also drive five of the newer type ocean-going vessels—two ice-strengthened tankers and three ice-strengthened cargo vessels built for Arctic service and operated by the Navy's Military Sea Transportation Service.

The engine has an air starting system working off two 250-psi Gardner Denver compressors driven by a 3-hp Louis Allis compressor motor. The diesel is coupled through a Hindmarch-DeLaval reverse-reduction gear, which has an input of 1,000 rpm and output to the propeller of 250 rpm. The gear has oil-operated clutches and a Kingsbury thrust bearing. The engine's turbocharger, designed and manufactured by Alco Products, Inc., is identical with units boosting the output of engines that drive Alco diesel-electric locomotives.

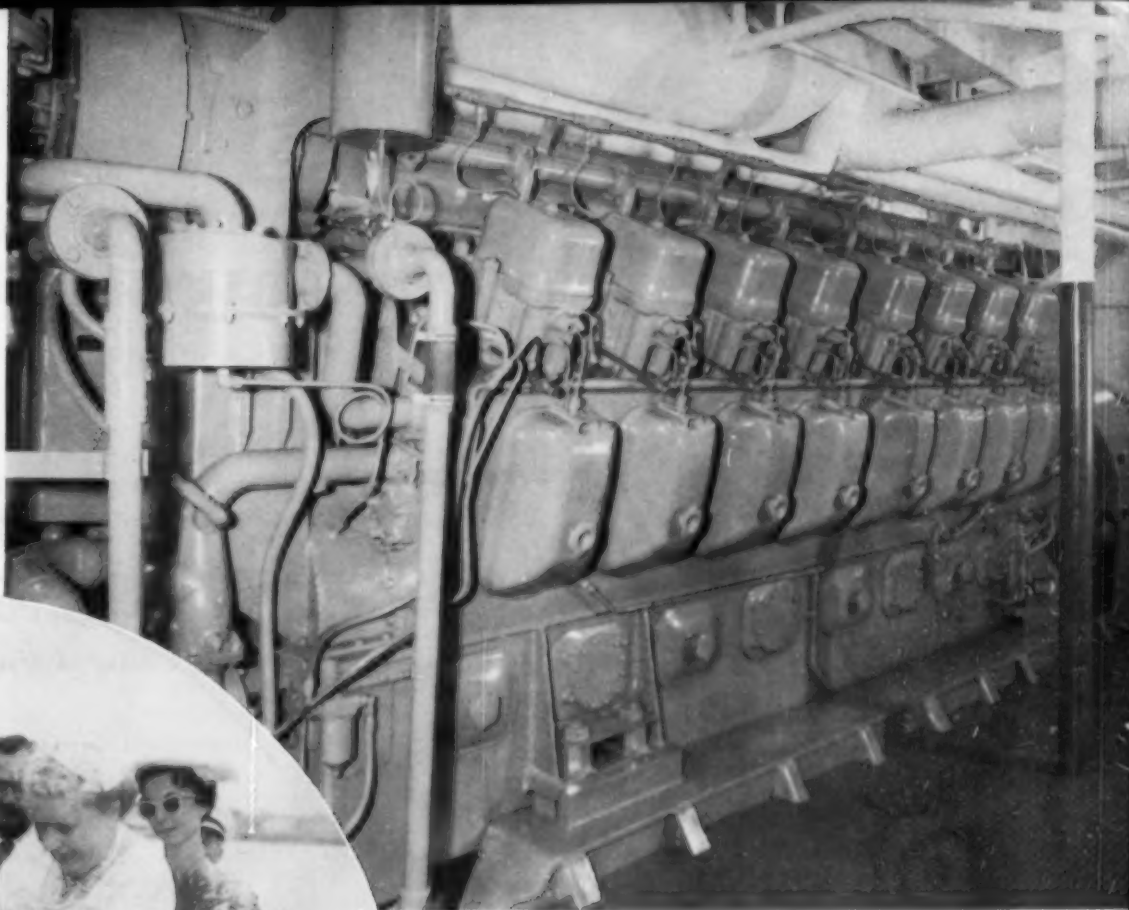
Propulsion equipment couples to a four-blade, 108-in. diameter Columbian bronze propeller through a forged steel, bronze-lined shaft manufactured by Equitable Equipment Company. Stern bearings were manufactured by Goodrich Rubber and supplied by Moffitt, the manufacturer of the

stuffing boxes aboard the tug. The *Savannah* has a single steering rudder. The new tug has accommodations for 10 persons. In addition to the master's quarters, the boat has four double staterooms on the main deck, each with double berths, together with an engineer's stateroom. The *Savannah* carries its own generating system in place of batteries, and its ship service generators are equipped with hydrostarters. It has a 20-hp, 24-in. after capstan and a 15-hp, 18-in. diameter forward capstan windlass with a wildcat for $\frac{3}{4}$ -in. dialock chain. The boat is equipped with dual controls in the pilothouse plus an auxiliary after-deck control station. In addition, in event of emergency, telegraph signals have been installed for communications between the pilothouse and engine room.



▲ Mrs. Frank W. Spencer christens the *Savannah* with water from the Savannah River. Standing back from the splash are Mr. Ted Gupton, District Sales Manager of Alco Products, Inc., Mr. W. P. Oster, Vice President in Charge of Sales at Equitable Equipment Co., Mr. Ted Dix, Marine Superintendent of Atlantic Towing Company, Miss Cecile Dix, the Maid of Honor.

Navigational aides include a magnetic compass, rudder angle indicator, a sound-powered telephone system, radiotelephone, radar, loran, radio direction finder, and depth-sounding equipment. The *Savannah's* fire fighting and lifesaving equipment conforms to United States Coast Guard requirements, and it carries two lifeboats with a total capacity of 20 persons. The boat is fitted to adhere to the Maltese Cross class A-1, harbor or ocean towing service, of the American Bureau of Shipping.



▲ The 2100-2400 horsepower Alco 16 cylinder, turbocharged marine diesel engine.

▼ Pilot house showing port and starboard single lever propulsion controls, radar magnetic compass steering stand, sound powered telephone, emergency pilot house to engine room bell and whistle pulls and rudder angle indicator.





WHAT'S GOING ON IN ENGLAND

CONDUCTED BY BERNARD W. LANSDOWNE

Bernard W. Lansdowne is an associate member of the Institution of Mechanical Engineers and is widely known among British and European diesel manufacturers as a former editor of our English contemporary "Gas & Oil Power." His early workshop training was spread over seven years with A.E.C. Ltd., Southall, following which he served some five years with that company's sales engineering department. He is now specializing in industrial advertising with Holes & Parker, Ltd. in London.

A New Engine Speed Control Unit

BRYCE Berger Ltd. of Staines, Middlesex, patented their first fully hydraulic governor in 1939 and governors now used on Napier Deltic and the British Admiralty Standard Range 1 marine diesel engines (ASR 1) have been developed from this early design. Bryce are now marketing their Speedlock engine speed control unit, a new governor based on the hydraulic principle combined with a powerful servo system.

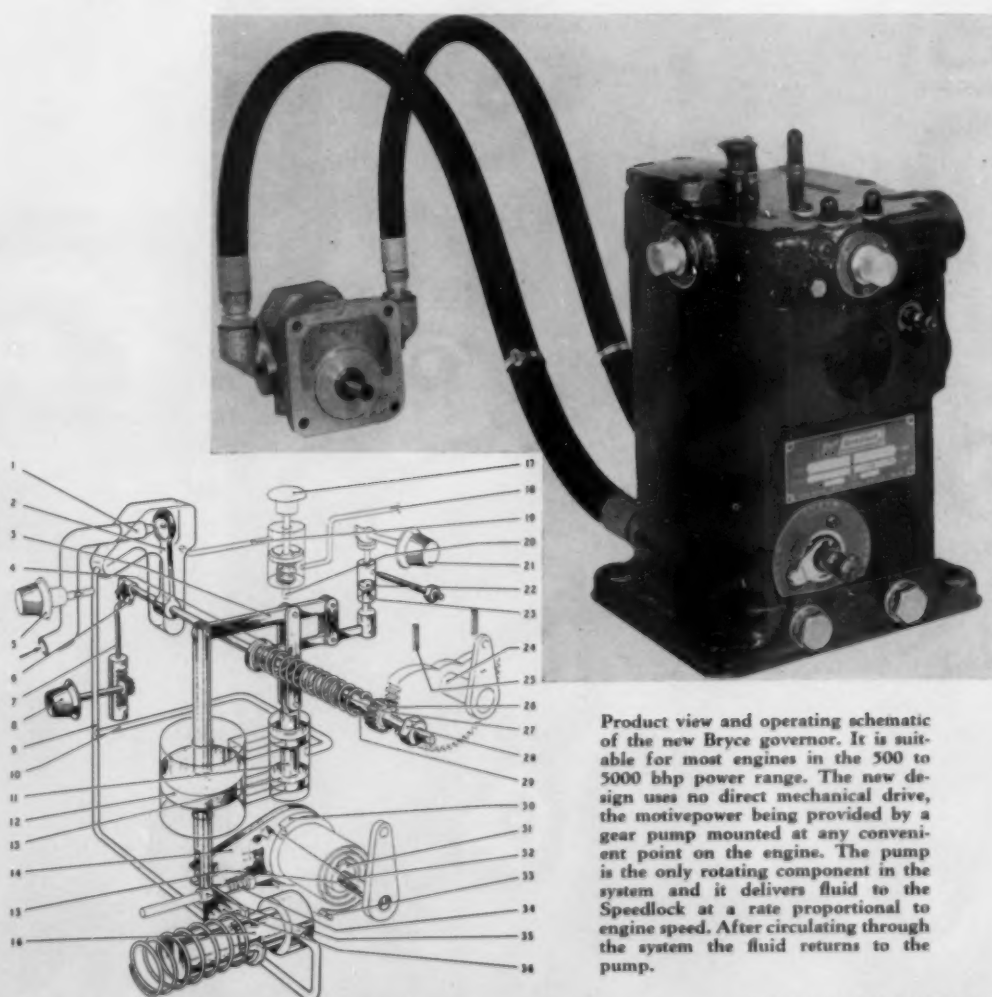
Fluid enters nozzle 1 and impinges in the form of a jet against the scoop, completely filling the scoop chamber. Arm 2, connected to lever 4 and speed control torsion spring 27, carries the scoop which the spring biases towards the nozzle. The other end of the control spring is anchored to boss 29 and it may be pretensioned and locked by a bolt and locknut at the required speed setting. Duct 9, leads the fluid from the scoop chamber into the accumulator spigot 16. Pressure rises and lifts the accumulator sleeve against its spring until it uncovers ports in the spigot and allows the fluid to escape into the main housing. The accumulator therefore maintains a constant pressure in the circuit downstream of the nozzle, and duct 10 feeds fluid from this constant pressure source to the spool-type servo valve 11. Differential lever 3 connects the servo valve, lever 4 and output piston 12; the valve is shown with all four port edges 13 closed. If engine speed increases and the scoop is deflected away from the nozzle, lever 4 falls and lowers the valve which in turn opens the upper edges of both port ducts. Fluid at pressure enters the lower duct and raises the output piston which displaces the trapped fluid above it through the upper duct into the housing. This motion raises the left-hand end of the differential lever and recentres the valve, once more cutting off the ports. The output piston therefore copies every movement of the scoop, and forked lever 14 transfers them to the output shaft 15 to which the engine control linkage is attached by a lever.

Maximum load limitation is achieved by control knob 21 which operates a cam and positions the stop inside cylinder 23. The stop prevents the damper piston and therefore the output shaft, from moving beyond the position determined by the setting of the knob. This knob is calibrated in percentage to coincide with a similar calibration

on the output shaft. For fixed speed applications, bolt 28 serves to set the correct nominal speed required, whilst knob 5 provides a 10 per cent adjustment. This knob operates a needle valve which by-passes the nozzle so that the more fluid the valve by-passes the faster the engine must run to maintain the same thrust against the scoop. For variable speed applications use is made of pinion 26, stops 25 and the speed selector shaft and quadrant 24.

The stop mechanism is operated by knob 17 which when pushed depresses the spindle to contact the differential lever and displace the servo valve

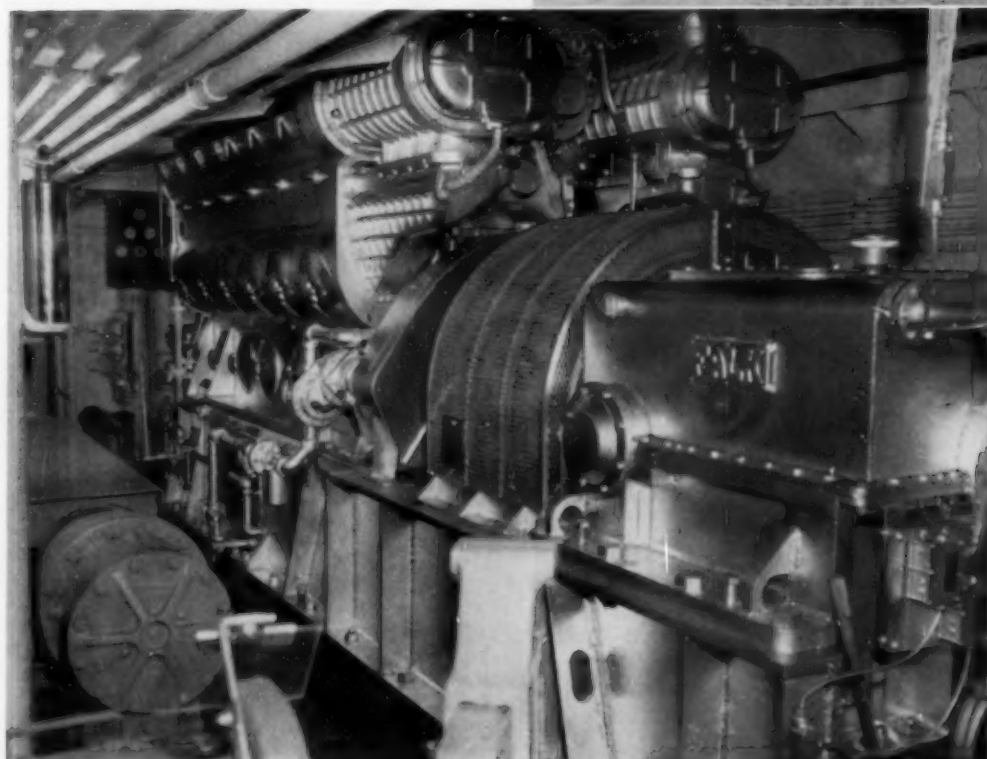
downwards. Output piston moves accordingly and exerts its full available force to shut off fuel. Spindle 20 also carries a piston, provided with a number of communicating holes closed by a disc valve. Duct 19 connects the upper side of the piston to the high pressure source, and duct 18 connects the lower side to a terminal point on the housing, for linkage to a valve when requiring to stop by remote control. As long as the valve is closed the system remains in equilibrium, but as soon as it opens, fluid flows from the high pressure source and depresses the piston stopping the engine. A "fail-safe" mechanism and a cocking device facilitates starting when energy is limited.



Product view and operating schematic of the new Bryce governor. It is suitable for most engines in the 500 to 5000 bhp power range. The new design uses no direct mechanical drive, the motivepower being provided by a gear pump mounted at any convenient point on the engine. The pump is the only rotating component in the system and it delivers fluid to the Speedlock at a rate proportional to engine speed. After circulating through the system the fluid returns to the pump.

WHEELING STEEL ADDS TOWBOAT *ROBERT E. REED*

By DOUGLAS SHEARING



THE *Robert E. Reed*, a towboat outstanding in performance and efficiency, has joined the river fleet of the Wheeling Steel Corp. following her recent successful trials. Designed and built by St. Louis Shipbuilding & Steel Co., the 2400 horsepower twin screw vessel was named in honor of Wheeling Steel's well-known marine superintendent who began his career as a pilot on the Ohio River.

Hull dimensions on the trim ship are 146 ft. x 29 ft. 3 in. x 9 ft. 6 in. with a normal draft of 6 ft. 6 in. Her well balanced profile is enhanced by the use of bus type windows, bulwarks and Wheeling Steel distinctive colors. The hull is heavily framed transversely and longitudinally, exceeding requirements of the American Bureau of Shipping from whom she received the highest classification for river service. Her model scow bow and stern lines were developed for best possible integration of Kort

nozzles and tunnels to develop maximum thrust. Inner surfaces and leading and trailing edge of the nozzles are type 304 stainless steel.

Propulsion power for the *Robert E. Reed* is supplied by two General Motors model 12-567C diesel engines rated 1200 hp each at 800 rpm. Each engine drives four-blade, 84 in. dia. stainless steel propellers at 226 rpm through Falk reverse-reduction gear units. Airflex clutches and GM pilot house pneumatic controls provide quick, positive engine handling. Engine cooling water is circulated through a St. Louis Ship designed skin cooling system. The builder also employed its hydraulic type steering system for the backing and steering rudders with mechanical follow-up controls. Position of the steering handles indicate precisely the position of the rudders at all times. Ample electric power aboard is supplied by two 100 kw GM diesel

Proud addition to the fleet, the *Robert E. Reed* was christened in June at Wheeling, West Virginia.

Lower engine room showing one of the two 1200 hp General Motors main propulsion engines and its Falk reduction gear.

Pilot house, control center of the vessel, is equipped with R.C.A. ship to shore radio and radar and a complete intercommunication system.



generator sets with Delco generators. Switchboard is designed for parallel operation of the generators with panels for 220 and 110 volt distribution. Well arranged, the engine room and auxiliary engine room provide easy access to all units. Stack exhaust fans and blower fans keep the areas comfortably ventilated. The steering gear room is immediately aft of, and is accessible from the engine room, making it possible for the crew to service steering power and control units regularly and easily.



GAS TURBINE PROGRESS

A COMMENTARY BY R. TOM SAWYER

R. Tom Sawyer's well known in the gas turbine field having been the first chairman (1944) (and now treasurer) of the Gas Turbine Power Division of ASME. He spent 7 years with G.E. Transportation Dept., and 26 years with American Locomotive, now Alco Products. At present he is a Consultant, including "Consultant to the Staff" of the Experimental Towing Tank at Stevens Institute of Technology. In addition to being a Fellow Member of ASME and AIEE, he is a member of SAE, ARS, ANS, IME in London, DEUA in London. He is also a member of Franklin Institute and a Professional Engineer. Mr. Sawyer is the author of *The Modern Gas Turbine* and *Gas Turbine Construction*, and co-author of *Applied Atomic Power*.

The Gas Turbine In The Air

WITH Capital Airlines successfully operating gas turbine jet-props for several years and now Northeast Airlines also operating Viscounts to say nothing of all the other airlines getting onto the gas turbine bandwagon sooner or later, the reader of this page may be interested in reviewing a few technical facts. Thirteen years ago Figures 1 and 2 were published in my book "The Modern Gas Turbine." Figure 1 is a simplified drawing of the jet prop. In order to have a pure jet engine the propeller is not used. Before getting into the technicalities of Figure 2 let's review the history. The correct history is given in the revised edition published in May 1947 in a day when airlines considered the jet as something "off in the blue". In those days Kenneth A. Browne and S. T. Robinson were two of the finest research engineers devoting their time to the turbo-jet, not only here but in Europe where this history was made. Sir Frank Whittle's patent dated January 30, 1930 was probably the first of a turbo-jet unit. He is recognized world wide as the inventor, engineer and main promoter of the jet power plant. He had a few who fortunately believed in him. Later he obtained leave from the Royal Air Force and together with a few associates formed Power Jets Ltd. This was done in order to develop his ideas. In the meantime patents were being issued on jet turbine units to Max Hahn, shop superintendent of Ernst Heinkel A. G. of Germany, which were actually invented by a young physicist, Pabst von Ohain. The result is that credit for the first successful flight of a turbo-jet powered aircraft goes to Germany with

the flight of the Heinkel He 178 aircraft. This airplane, powered with the Heinkel He S3b unit, first flew on August 27, 1939. This information was not released until after the war. Then Sir Frank Whittle realized that his first flight in May 1941, was not the first turbo-jet plane to fly. I'm sure many of his friends, who in the years gone by tried to discredit his idea, then decided to "climb on the bandwagon." So today we are in the 20th year of jet flight, and only today are the airlines starting to put the gas turbine into the air.

Figure 2 shows us a very interesting comparison between the power produced by a reciprocating engine driving a propeller, the turbo-prop shown in Figure 1 and the turbo-jet. The thrust horsepower of the jet is low at low speeds due to the jet stream coming out of the rear of the turbo-jet having the effect of slipping and not pushing the air. The greater the speed of the plane the greater the effectiveness or push is in the jet stream—the reason the jet is preferred for high speed travel. To figure the horsepower of the turbine jet unit we go back to the old formula of horsepower equals tractive effort or force times miles per hour divided by 375. When you read about a new jet engine having "10,000 lbs. thrust" how can you compare that to the horsepower in our own automobile or diesel engine power plant. Actually thrust of the turbine jet unit is approximately constant at all speeds. But applying this formula we find the horsepower and the thrust are the same at 375 mph which means that at half this speed the thrust would remain 10,000 lbs. but the

horsepower would be only 5,000 hp. However, if we double the speed of 375 mph to 750 mph we find the actual horsepower developed is 20,000 hp. This is the simple reason why the jet is used for this high speed work and the propeller remains for the present class of service. In the case of Figure 2 we find that at an elevation of 10,000 ft. the jet unit shown has a thrust rating of 2800 lbs. which is taken at 375 mph. At 30,000 ft. this same unit has a thrust rating of 1500 lbs. As the curves in Figure 2 were actually drawn up over 13 years ago they do not apply to the large airline planes of today but they do apply to today's smaller executive planes and the relationship between engine, turbine propeller and jet are well proportioned. So when you are riding in a jet plane today you can take these few simple figures and quickly calculate the tremendous horsepower that is being produced to propel a relatively light weight vehicle through the air, not only fast, but without vibration and with the utmost comfort.

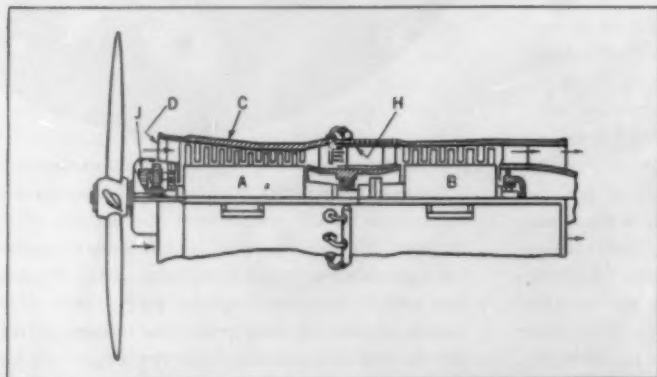
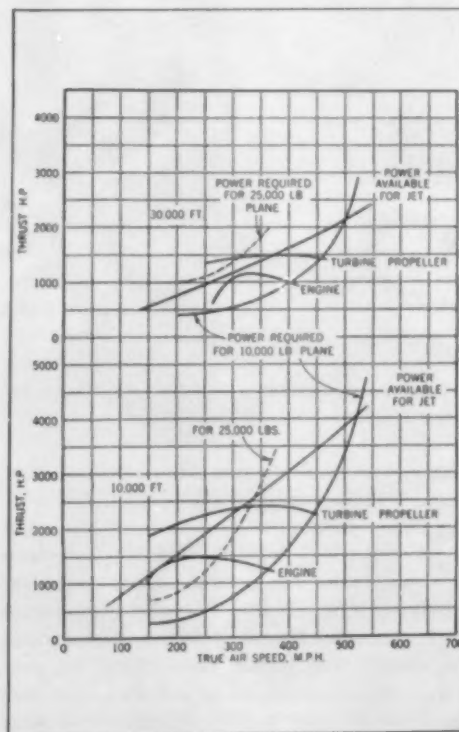


Figure 1, Brown Boveri gas turbine for airscrew and jet propulsion. This illustration is originally from the book, *Gas Turbines and Jet Propulsion*, by G. Geoffrey Smith and is reproduced from *The Modern Gas Turbine*.

Figure 2, Power curves reproduced from *The Modern Gas Turbine*.



A — Compressor rotor. C — Casing. H — Heat-resisting shell.
B — Turbine rotor. D — Annular air intake. J — Airscrew reduction gear



UNIVAC SPEEDS ENGINEERING ANALYSIS OF DAMPERS AND TURBOCHARGERS

APPROXIMATELY three years ago a Remington Rand Univac 60 Digital Computer was installed at Schwitzer Corporation in Indianapolis to expedite management and operating reports. Recognizing the efficiency of this equipment and that through its use the possibility of human error in calculation is measurably reduced, Schwitzer now employs Univac in its engineering analysis of torsional vibration crankshaft dampers and turbochargers. Application of the equipment was worked out with the assistance of a Remington Rand methods engineer and two programs were established to solve the many engineering equations and compute test results.

Schwitzer turbochargers are run through their paces in test cells and varying conditions under which each must operate are carefully duplicated in the engineering laboratory. Data from test runs is entered on printed forms and normally there are

six to nine test data sheets on each speed at which the assembly is tested. Using a desk calculator, about 45 minutes was required to compute each sheet or a total of four to six hours for the group. Tests are generally run at five different speeds so a total of 15 to 20 man hours were required for computation. With Univac, card programming was used to break down the functions of the equation into simple arithmetic steps. Sub-routines were used including logarithm and exponential equations.

Production of dampers requires a multitude of calculations to complete the proper designs. First step is obtaining the natural frequency of the engine which is accomplished by using the Holzer tabulation method. In this method the frequency is first assumed based on prior experience and familiarity with the variables that exist. If this assumption is correct, the summation of torque will be zero. If incorrect, the entire process must

be repeated and the number and complexity of the calculations frequently makes errors possible. By employing Univac a program was established utilizing the "educated estimate" and was called the "Bridge". The Bridge was programmed to use the estimate and calculate the problem in a rough manner, then decrease or increase estimated frequency (Ω) dependent on the answer being positive or negative. The computer was wired to stop when it arrived at an answer within $\pm .009$. This method refined the original guess to a rough figure. A second set of panels completed the calculation by further refining the rough figure. Total time to print answers, after computing, amounted to about one hour.

Advantages of this system are evident with human error eliminated, substantial time saved and the engineering personnel freed to exert their greatest efforts in creative work.



DIESEL SERVICE PROGRESS

A COMMENTARY BY GEORGE R. MACKEY

George R. Mackey was long associated with Detroit Diesel Engine Division of General Motors Corp., and had prior experience as a mechanic in Europe and the U.S.A., which enabled him to become well acquainted in the diesel and service fields and to obtain a broad scope of the service industry from the customer's and management's viewpoint. Further training at Carnegie Tech and in the Army Ordnance during World War II provided the necessary requirements in planning service programs. Progressive advancement in diesel service areas in General Motors and with Detroit Diesel led to his position as Supervisor of Service Promotion. Upon termination of employment with General Motors in 1952, he joined Clayton Manufacturing Company, and his present position with this organization is Sales Manager of the Dynamometer Division.

Departmentalizing Service Shop Activities

QUITE often departmentalizing all or part of a service shop's activities can result in many benefits, and will generally have a direct influence on the overall shop layout and Service Department operation. Departmentalizing can also contribute to the establishing of sequences in which the handling of parts and major assemblies, the overhaul of sub-assemblies, and complete engine or equipment assemblies will be beneficial to the overall department productivity. When a shop is departmentalized, it will, of necessity, specify the various fixtures, special tools, equipment and standard hand tools required for the smooth, efficient operation of each individual section or department. Proper tooling and the ultimate end result, in terms of accomplishment, are definitely influenced by the planning and organization of a service shop properly departmentalized. By accurately determining the amount of time required for each operation, and the tools and equipment needed in each of the departments, a Service Manager can easily evaluate the expected productivity, and can determine when the full work load for a given department is reached. Likewise, a Service Manager can determine when a given area is not in full production and can make the necessary changes. One Service Manager of a departmentalized shop, when confronted with the responsibility of setting up for torque converter overhaul, found that this new service could be included in the department doing blower and turbo-charger overhauls. Another included governor overhauls in with fuel pump and injector rebuilding, while another, wishing to utilize the Dynamometer operator's time during engine run-in, set up a connecting rod bushing service operation in the Dynamometer test area.

While the operations in shops will vary, the departments should be arranged so that service work through the shop will follow a flow pattern which will minimize movement of parts and assemblies, will save time and avoid the possibility of congestion. Departments, or individual areas specified for each type of job, have proved to be very effective from the standpoint of maximum work effi-

Service Shop Planning

ciency and the minimizing of countless hours of lost production time caused by visiting and outside interference or disturbance. Furthermore, the orderliness and improved appearance of specialized work areas has reportedly had a definite influence on the morale of the entire service organization, as well as creating a favorable impression on customers who visit the service shop. The very nature of specialized work performed in specified areas provides for keeping dirty jobs away from clean jobs, and will play an important part towards making each member of the service organization proud of his shop, his job, and to be a member of an efficient, progressive team.

The Location of the Service Manager's Office

An active Service Manager has a great many responsibilities, including shop layout, maintaining shop operation efficiency, planning work schedules for both inside and outside service personnel, maintaining employee relationship, handling customer service problems, and many others. In many respects, the successful Service Manager is the center or the predominant factor in the profitable operation of a Service Department. Therefore, the location of his office is certainly worthy of consideration. Generally, the Service Manager's office need not be too large, unless exceptional circumstances dictate the necessity of large quarters, but it must be large enough to handle the work load. Some of the most successful operations are equipped with a Service Manager's office that does not exceed from 140 to 200 square feet of space. If the question were asked—Where should the Service Manager's office be located?—it is obvious that each Service Manager would have many ideas towards preparing the answer, each answer would undoubtedly differ, and would be influenced by the type of business the organization is servicing and the type of equipment serviced. For all practical purposes, a few simple rules can generally be applied for determining the most advantageous location of the Service Manager's office:

1. It should be conveniently located with respect to meeting service customers.
2. It must be located so as to enable the Service

Manager to oversee the work in progress.

3. It should be close to a reception area.
4. It should be as far away from noise as possible.

Because the Service Manager is generally in close contact with customers, and may often confer with customers in his office, the appearance of the office is very important. It should be clean, attractive and orderly at all times. It should be well ventilated and, in exceptionally hot climates, air-conditioned. It should be well equipped with desk, small conference table, chairs, shelves or bookcases for manuals, bulletins, application prints and specifications. A favorable impression will be made upon customers and other visitors if technical school or special school diplomas, certificates, or other awards, are prominently displayed. In short, the office, while being the center of a service activity, should be pleasing and attractive to the customer.

The Location of the Service Shop in Relation to the Overall Activity

There are many factors relative to the location of the service shop and its relationship to the rest of the organization's activities, especially in an engine or equipment distributorship. These must be considered when planning the Service Department area. While the exact details for a specific service operation will be determined largely by local circumstances, type of equipment serviced, etc., any good layout should include: 1. Receiving and shipping area; 2. Cleaning areas; 3. Overhaul and assembly areas; 4. Parts and stock areas; 5. Dynamometer Test area; 6. Painting area; 7. Storage space. Very often, to conserve space, the receiving and shipping can be handled in the same area. An area suitably equipped for steam or solvent cleaning should be provided close to or adjacent to an entrance-way so that larger equipment can be cleaned away from the overhaul area where dirt will not be carried into the shop proper. The overhaul and assembly area must be laid out to accommodate all lines of equipment serviced. Parts and stock areas should be enclosed and separate from the rest of the shop. The Dynamometer test area should be located so as to receive engines after overhaul,

without having to disrupt other operations. It should also be located so that the normal noise of engines, power units or tractors operating under full load will not annoy other departments or those handling telephone calls. The painting area in a modern service operation should be a well ventilated room or booth set up separately from the rest of the shop.

There are a number of methods that can be applied to the planning of a Service Department so that the building and facilities will enable the operation to fulfill all of its service obligations. If the following basic rules are included during the planning stages, a great deal will later be accomplished:

1. Apply service analysis to determine potential.
2. Realize that to perform a service there is a relationship between space and man power.
3. Determine methods to obtain full productivity of all workable space.
4. Where practical, realize the effect of departmentalizing on the total operation.
5. Realize that the service shop is the Service Manager's responsibility, and his control point for the entire service operation.
6. Realize that the operation of the service shop sets a pattern for the entire Service Department to follow, and will influence the department's ability to operate at a profit or loss.

The Customers' Impression of a Service Shop

Usually we think good customer relations are obtained only by the way customers are handled by the Service Department. This is not entirely true. Actually, it may often start before anyone in the department is involved. The impressions that are created by what the customer sees, or word of mouth impressions passed on by other customers who have seen, are quite often impressions that are lasting ones and may always be the influencing factor in a customer's attitude toward a particular service operation. To be sure of creating favorable customer impressions, the Service Manager must continually strive to keep the shop well organized and efficiently operated. He must be continually on the lookout for better methods of operation and to insure a smooth flow of work through the shop. These and other phases of shop operation are influenced by the overall shop layout and the planning that is behind the shop layout and operation.

Cape May Party Boat

The pleasure of catching the big ones on a deep sea fishing trip depends largely on the party boat's speed, roominess and safety. And the *Big Jim II* put into service at Cape May, N. J. recently by Captain A. J. Dulinski is rated as superior in all three departments. Captain Dulinski explains large fish abound in deep areas 20 to 25 miles off Cape May and to make these runs in a reasonable length of time a boat has to be seaworthy and very fast. The 65 ft *Big Jim II* is this type of boat challenging previous records for the course with a top speed close to 20 knots. Her running time from Cape May to productive fishing area 20 miles offshore is less than one hour which permits plenty of exploring before the anchor is dropped. Passenger ca-

capacity exceeds 75 persons and each has plenty of fishing room on deck.

One of the largest and fastest head boats in the Cape May-Wildwood area by actual tests, *Big Jim II* can be taken 35 miles to sea with ease and safety. Power is delivered by two 300 hp General Motors Turbopower diesel engines which provide maximum safety at sea. The six-cylinder GMs, supplied by Johnson and Towers, Inc., of Philadelphia, turn a 32 in. x 32 in. three-blade Columbian propeller through 2.5 to 1 reduction gears. The wheel house is equipped with the latest navigation and safety devices which include a Bendix scanner-type Depth recorder, a 65-watt Raytheon ship-to-shore telephone, a Karr direction finder, an automatic pilot and a RCA loran. The craft of V-bot-



tom construction with a beam of 18½ ft and a 3½ ft draft was completed in November by the Stowman Shipyards of Dorchester, N. J.

Accelerated Engine Test Comparison Proves EATON SUPER-ALLOY VALVES LAST MANY TIMES AS LONG

AS VALVES MADE FROM COMMONLY USED ALLOYS



COMMONLY USED ALLOY
Failed at Less than
600 Hours

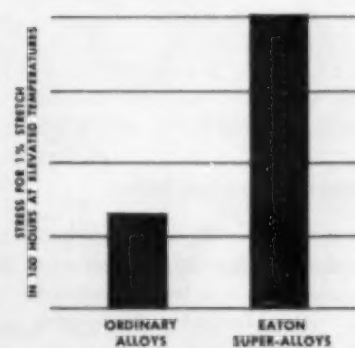


EATON SUPER-ALLOY
in Excellent Condition
after 3000 Hours

To meet the requirements of extreme heavy duty service, Eaton has developed unique production methods for the making of exhaust valves of super-alloys possessing exceptionally high hot-strength and corrosion resistant properties. These Eaton Super-Alloy Valves are "custom tailored" to meet the specific requirements of the engines for which they are designed.

As a pioneer in the development of valve designs and materials which have added thousands of miles to valve life expectancy, Eaton has made such important contributions as sodium cooled valves, seat-faces of high-alloy materials, aluminized valves, and now super-alloy valves.

If you build engines—either gasoline or diesel—for heavy duty applications such as motor trucks, buses, earth moving machinery—it will pay you to discuss the advantages of Eaton Super-Alloy Valves with our engineers.



The results of laboratory tests represented by the above graph indicate the superior hot-strength of Eaton Super-Alloys over commonly used exhaust valve materials.

EATON

VALVE DIVISION
MANUFACTURING COMPANY
9771 FRENCH ROAD • DETROIT 13, MICHIGAN

PRODUCTS: Engine Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Hydraulic Pumps
Motor Truck Axles • Permanent Mold Gray Iron Castings • Forgings • Heater-Defroster Units • Automotive Air Conditioning
Fastening Devices • Cold Drawn Steel • Stampings • Gears • Leaf and Coil Springs • Dynamic Drives, Brakes, Dynamometers

Automatic Renewable-Media Air Filter

A newly-designed Roll-O-Matic automatic renewable-media air filter that is shipped in small cartons has been introduced by American Air Filter Co., Inc. The new modular design cuts installation time in half, permits easier storage on the job site and does not require rigging for installation. Other features of the new Model B include stronger media that is reinforced for greater strength and incorporates an adhesive which will not run in high temperatures, thicken in low temperatures, nor lose its adhesive qualities due to dryness. Also listed as advantages by the manufacturer: galvanized construction which minimizes corrosion problems; new media supports which add to the structural strength of the frame and serve as media supports; an improved drive located on the service side of the unit which will serve as many as six units; maximum use of effective filtering area; an average of 12 months' supply of filtering media in a standard 65 in. roll of Roll-O-Mat. The new Roll-O-Matic is available in vertical sections of 3 ft, 4 ft and 5 ft widths and in heights from 5 ft to 15 ft, by four in. increments. Resiliency and flexibility of the glass fiber media permit a roll of 65 lineal ft to be compressed on a spool to about four cubic feet, yet resume its original 2-in. thickness when exposed to the air stream. The used media, with its accumulated dust load, is tightly rewound on the bottom spool for easy disposal. Each Roll-O-Matic air filter is equipped with built-in run-out switch which provides a warning when the end of the Roll-O-Mat has been reached on the supply roll. A red signal light is furnished as part of the control assembly but may be located to the control box if desired. Further information on the new Model B Roll-O-Matic automatic renewable-media air filter can be obtained by writing to Dept. PD, American Air Filter Co., Inc., 215 Central Avenue, Louisville 8, Ky. **(ITS NEW)**

Manager of Foreign Sales

Robert E. Gottron, one of the nation's early airmail pilots and an experienced export executive, has been appointed manager of foreign sales of Hercules Motors Corporation, it has been announced by William L. Pringle, president. Mr. Gottron, a native of Fremont, Ohio, received his education in the public schools there and at Case Institute of Technology in Cleveland. In World War I he served with the Aviation Section of the U. S. Marine Corps and later was a pilot in the early airmail service. Shortly after World War I Mr. Gottron began his engineering career, serving in various capacities with the

White Motor Co. at Cleveland, the Willys-Overland Co. at Toledo, the Ford Motor Co. and Packard Motor Car Co. of Detroit and the Cadillac Motor Car Division of General Motors Corporation. He joined the engineering department of the Hercules Motors in 1936 and later was transferred to sales engineering. During World War II he served as inspection officer at the Los Angeles Base Shop of the U. S. Army Ordnance Department with the rank of major. He has been connected with the foreign division of Hercules since his release from the army.

Spray Cleaning Unit

Tysol Products, division of Chemical Research Associates, has announced a new method of spray cleaning with their portable Tysol Spray Cleaning Unit Model No. 525 and the Tysol Cleaning and Rinse Gun Model No. 500. This spray cleaning combination represents a new, fast and economical system for removing greases and heavily encrusted deposits of oil and dirt from diesel engines, truck engines and bus engines.

Major advantages reported by Tysol are: 1. No heat required for cleaning or rinsing operations. 2. Controlled use of water. 3. Controlled spray pattern. 4. Cleaning time reduced 50 to 75%. 5. More thorough cleaning. 6. Model No. 500 Cleaning and Rinse Gun adjusts for all unequal air and water pressures. 7. Completely portable. For further information contact: Tysol Products, 333 N. Michigan Ave., Chicago 1, Ill. **(ITS NEW)**

New Cleaning Compound

Magnus Magnusol X-4 has been formulated for the removal of grease and oil from metal surfaces. This new Magnusol X-4 is manufactured from a new type emulsifier which is odorless. Solutions of one part Magnusol X-4 to six to ten parts water or one part Magnusol X-4 to six to eight parts kerosene, will completely remove oil when sprayed, brushed or wiped over an oily surface followed by a pressure water rinse, according to the manufacturer. These Magnusol X-4 solutions can be used on painted surfaces as well as on bare steel. This new formulation can be used on polished and buffed steel parts without staining or discoloring them. Magnusol X-4 can be used for tank cleaning with very satisfactory results. A mixture of one part Magnusol X-4 to four to six parts water is heated to 160-170°F and used in an agitating machine such as the Magnus Aja-Dip or Aja-Lif to remove oil, grease, light dirt, etc. from metal parts. Time of cleaning varies from 5 to 15 minutes. For additional information about the job Magnusol X-4 can do for you in your cleaning

operation, write the Magnus Chemical Co., Inc., South Avenue Garwood, New Jersey. **(ITS NEW)**

Wins Sales Award

The Mexico City Branch of Fairbanks, Morse & Co., Chicago manufacturers of diesel engines, diesel locomotives, pumps, motors and scales, won the 1957 sales award offered each year by the company, according to Robert H. Morse, Jr., President of the corporation. The award, consisting of a huge silver trophy appropriately named "The Colonel Robert H. Morse Cup," was presented by Colonel Morse himself to the Mexico City Branch at a special dinner recently at the Continental Hilton Hotel in Mexico City. Mario A. Gesque, manager of the Mexico City Branch, received the cup from the Colonel on behalf of his sales organization. On the cup was engraved the name of Sr. Leopoldo Escudero Hamilton as the honor salesman of the Mexico City Branch for the past year.

The cup was presented in recognition of the Mexico City's 1957 sales record which achieved the largest percentage of quota of any of the company's sixteen branches. This was the 25th year in which the company has presented a sales achievement award of this kind. In commenting on the award Robert H. Morse, Jr., President, said that "We are proud indeed to be operating both a factory and a branch house in Mexico. The opportunities in Mexico for increased sales are excellent and the future of Fairbanks-Morse de Mexico is indeed assured."

Manager Of Parts Sales

T. L. Mellish is appointed manager, parts sales, for the Construction Machinery Division, Allis-Chalmers Mfg. Company. He has been assistant manager since February, 1956. Prior to that he was in parts sales at the Springfield, Ill., Works, where he joined the company in 1936. He is a native of Thayer, Ill.

Mechanical Force Gauge Folder

A new illustrated six-page folder describing its complete line of mechanical force gauges has been issued by W. C. Dillon & Co., Inc., manufacturer of scientific testing instruments. The booklet is available free of charge to interested industrial concerns. Comprised of twenty-three action photographs of Dillon Force Gauges in actual use, the folder also includes complete specifications, dimensions and capacities. For detailed engineering data and prices write George A. Dillon c/o W. C. Dillon & Co., Inc., 14620 Keswick Street, Van Nuys, California.

European Office Opened

The opening of a new European office has been announced by T. A. LaBrecque, Vice-president and Manager, Purifier Division, The Hilliard Corporation, Elmira, N. Y., makers of Hilco oil purification equipment. The new office in Zurich, Switzerland, will handle sales and service of the company's European representatives. Maurice Kunstenaar, formerly manager of Hilliard's Export Department in Elmira, has been transferred to Zurich. He will be in charge of coordinating Hilliard's European activities in the oil purification market. Hilliard's remaining export matters, outside of Europe will continue to be handled from Elmira, the company's main office.

Announces Sales Organization

The Lengor Co. of Annapolis, Maryland, manufacturers of the Simplex Oil Testing Kit, has appointed Mr. Harold Sharp of Elkins Park, Pa., as their National Sales Manager. Mr. Sharp will have full responsibility for the sale and promotion of the oil testing kit within the continental limits of the United States.

Packing Rings Improved

An improvement in the metal finish of their packing and scraper rings used in floating metal packing for compressors handling air and other industrial gases has been announced by The Garlock Packing Company of Palmyra, N. Y. The new rings, currently being marketed by Garlock, have a surface finish of less than 10 micro in. on the annular surfaces, whereas previous rings had a finish of 30 to 40 micro in. These new rings are also flat within light band readings, resulting in more perfect sealing over a broader range of applications. The described improvements are now standard on all production rings. Further information regarding the new highly finished scraper and packing rings can be obtained by writing to The Garlock Packing Company, 418 Main Street, Palmyra, N. Y.

Announces 1958 Industry Directory

Associated Equipment Distributors announce the publication of their new 1958 Industry Directory. The new book is reputed to be the most complete reference available of construction equipment distributors, manufacturers, products and trade names. A 382 page volume, it contains company names, addresses, key personnel and phone numbers for over 2,000 firms in the construction equipment industry. The A.E.D. Industry Directory is divided into four

separate sections: 1) *Distributors*—Approximately 1,400 distributing companies throughout the United States and Canada, and their branches, listed alphabetically by state, showing manufacturers represented. 2) *Manufacturers*—Over 600 manufacturers of construction equipment in the United States and Canada, listed along with their distribution outlets. 3) *Products*—An alphabetical listing of construction equipment and accessories, comprising a complete product reference to the construction equipment industry. 4) *Trade Names*—A compilation of product trade names used by manufacturers of construction equipment and accessories, sold throughout the U.S. and Canada. The A.E.D. Industry Directory has become widely adopted as a guide to the construction industry, serving as a valuable reference for users of construction equipment. The 1958 Industry Directory is available at \$20.00 per copy from Associated Equipment Distributors, 30 East Cedar Street, Chicago 11, Illinois. **(ITS NEW)**

Packaged Boring Unit

Greenlee Bros. & Co. has developed a new, compact, packaged boring unit, the Model S-7 Hydro-Borer with 1 1/4 in. dia. spindle. This packaged boring unit is a low cost, close tolerance boring machine that makes it possible to put precision boring into production assembly. The S-7 packaged boring unit is flexible and adaptable. It is designed specifically for mounting on jigs, fixtures and multiple station machines. Further information about the Greenlee Model S-7 Hydro-Borer or any of the other Greenlee machines can be acquired by contacting Greenlee Bros. & Co., Rockford, Illinois. **(ITS NEW)**

Coupling Bulletin By Dana

Industrial Couplings is the title of a design catalog being offered by the Standard Equipment Division of Dana Corp. to engineers and designers who employ needle bearing universal joints in agricultural, industrial, marine and irrigation applications. A complete guide to the selection of many types of universal joint drives, this 16 page illustrated booklet lists torque ratings, operating speeds, slip joint movement allowances, maximum operating angles, and physical and mounting dimensions for the entire range of standard Spicer universal joint assemblies. Copies of this universal joint design guide may be had by writing the Standard Equipment Division of the Dana Corp., 253 Waggoner Boulevard, Toledo 1, Ohio, and requesting Catalog No. 1J320-1. **(ITS NEW)**

Line of Capacitor Motors

A new line of heavy duty capacitor-

start induction-run single phase integral horsepower motors designed to provide high starting torque and operating efficiency has been announced by Fairbanks, Morse & Company. These motors incorporate a number of unique features to insure trouble-free operation under severe operating conditions. For starting, the new motors use top-quality capacitors of the dry electrolytic type de-

signed for maximum starting torque with minimum current usage. When the motor gains speed, a rugged centrifugal switch cuts out the capacitors for straight induction run. The switch is of unusual design with over-size snap action contacts. They are easy to reach through the access cover and can be replaced without disturbing the centrifugal actuating mechanism or any other

part of the motor. These F-M single-phase induction motors are especially suited to the severe conditions and high starting torque required for service with: pumps, fans, and similar equipment. These Type WCZK single-phase 60-cycle, 115/230 volt motors are available from 3/4 hp to 1 1/2 hp at 1200 rpm, 1 hp to 3 hp at 1800 rpm, and 1 1/2 hp to 5 hp at 3600 rpm. **(ITS NEW)**



Prescription Filtration



FOR DIESEL ENGINES

WIX offers many outstanding filtrants especially engineered to provide a Prescription type Cartridge for your individual operating conditions. WIX has developed every filtrant for peak dirt retention—even microscopic particles are trapped—to give greater intervals between Cartridge replacements and higher filter efficiency during the longer life of every Cartridge.

USE **wix**®

FILTER CARTRIDGES on ALL Your Diesel Engines!

Let WIX team-up with you to give your Diesels the Prescription Filtration that stops costly engine failures and equipment down time. WIX Lube, Fuel, and Air Filter Cartridges keep damaging dirt, grit, and sludge out of vital engine areas. Install WIX HEVI-DUTY Cartridges in all your Filters for money-saving, trouble-free filtration. They're made especially to stand up under the toughest operating conditions and work schedules.

Your Diesel engines get more protection and longer service life with WIX—and, at an amazingly low cost. That's why WIX is in such wide use as original filtration equipment, as well as the first choice for replacement at so many job-sites where Diesels are working.

Call your distributor, or
write direct for your
complete catalog.



FREE



WIX CORPORATION • GASTONIA, N. C.
In Canada: Wix Corporation Ltd., Toronto



for every requirement

STRATOFLEX

HOSE & FITTINGS

- Fuel Lines • Hydraulic Systems
- LP-Gas Lines • Air Brakes
- Lubrication Systems • Water
- Coolants • Refrigerants

Made in a wide variety of sizes and types for hundreds of commercial and industrial uses, Stratoflex detachable and reusable fittings simplify maintenance and assure leak-proof connections under extreme temperature variations. Stratoflex hose provides the flexibility, small bend radii and durability essential for dependable service.

For detailed information, write for industrial catalog.

SF7-8

STRATOFLEX Inc.
 P.O. Box 10398 • Fort Worth, Texas
 Branch Plants: Los Angeles, Fort Wayne, Toronto
 In Canada: Stratoflex of Canada, Inc.

SALES OFFICES:
 Atlanta, Chicago,
 Dayton, Detroit,
 Houston, Kansas
 City, Los Angeles,
 New York,
 Pittsburgh,
 San Francisco,
 Seattle, Toronto,
 Tulsa

Rotary Rock Drilling Rig

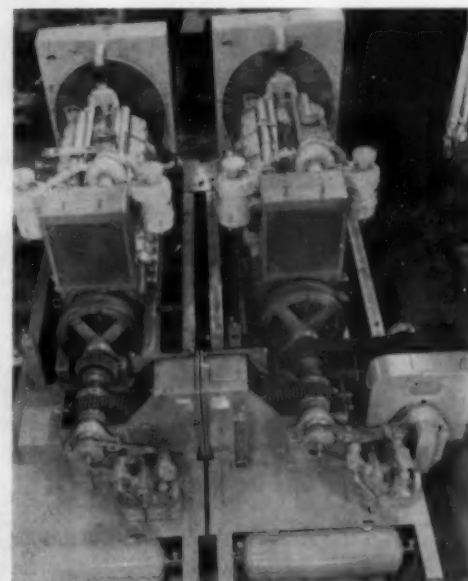


Two General Motors diesel engines power this new rotary drilling rig announced recently by the George E. Failing Company of Enid, Okla. The new rig is designed for use largely by the mining, quarry, highway and construction industries. It is recommended for drilling blast holes, taking cores, soil sampling and other foundation work. The unit, mounted on a GF-660 Crane Carrier truck, is equipped with a six cylinder General Motors diesel engine driving a 100-S2 Le Roi air compressor. The truck engine, also a GM diesel model, furnishes power for the rotary table. The new rig is designed to use both conventional type rock or drag bits and also the new down-the-hole tools. Down-the-hole tools are recommended by the manufacturer for extremely hard formations.

ITS NEW

Interchangeable Oil Rig Engine Units

An unusual degree of interchangeability between units is incorporated in special power equipment manufactured at the Torrance, Calif., plant of The National Supply Company for use in drilling in a heavily-forested area of a South Pacific island. The equipment includes a two-section drive



group for a National Type 50 draw works, a two-section drive group for a National Type G-700 slush pump, a single-section independent pump drive, and a standby engine unit. The No. 1 sections of the two-section drives are interchangeable

as complete units with each other and with the single-section independent pump drive. The engine ends of all sections are interchangeable with each other and with the standby engine unit. Each engine unit consists of a Caterpillar D-397-D T/C engine, mounted on a skid with a National B-275-80 FC torque converter. The engine end of the frame of each drive unit is constructed with a number of transverse beams below floor-plate level, so that the frame serves as a cradle for any of the six identical engine skids. In case of difficulties with any of the drive group engines, it is necessary only to loosen a few bolts so that it can be removed and the standby engine substituted. Shaft assemblies for each of the five drive sections are identical, including Airflex engine clutches, sprockets, bearings and housings, and air compressor drives. Compound chain enclosures of the No. 1 sections are flanged on the open end to mate perfectly with the No. 2 sections. Each section carries its own air compressor, drive, and air receiver tank, so that substitution of sections or of shaft assemblies requires no changes in the air supply system.

New Line at Diesel Engine Sales— Fort Myers



Diesel Engine Sales of Fort Myers, which for several years has specialized in the repair and refitting of fishing vessels, has begun a program of building a new series of DESCO trawlers. These new Tams designed 53 footers are a fast and highly maneuverable trawler, and like all the other 700 DESCO vessels are of the finest in craftsmanship. The Fort Myers yard is under the management of Kenneth Pacetti, who received much of his ship building experience at the St. Augustine yard of Diesel Engine Sales. Present plans call for the launching of one craft a month. One of the first vessels launched at the Fort Myers yard was the *Nite Hawk*. The new trawler is 53x16x4 ft and is owned by Beach Shrimp Co. of Fort Myers Beach, Florida. The *Nite Hawk* is powered by a model D326 Caterpillar diesel engine furnished by the Gibbs Corp. This 6 cyl 4 cycle diesel delivers a max hp of 200 at 2000 rpm through 4.4:1 Snow Nabstedt r&r gears.

HERE IS IMPORTANT INFORMATION! The completely new 1958 edition of the **DIESEL ENGINE CATALOG**, Volume 23, is now available. If you design, purchase, sell, operate or service diesel, dual fuel or gas engines, the Catalog is essential to you. This giant, 400 page, 10½" x 13½", fully illustrated reference book has been revised, rewritten and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs \$10 postpaid plus California sales tax where applicable. Send checks or company orders to **DIESEL ENGINE CATALOG**, 816 N. La Cienega Blvd., Los Angeles 46, Calif.

OCTOBER 1958



Jim Miller,
Shepherd
Machinery Co.'s
General Service
Manager,
administers
one of the
country's
largest and
most modern
heavy equip-
ment repair
facilities.

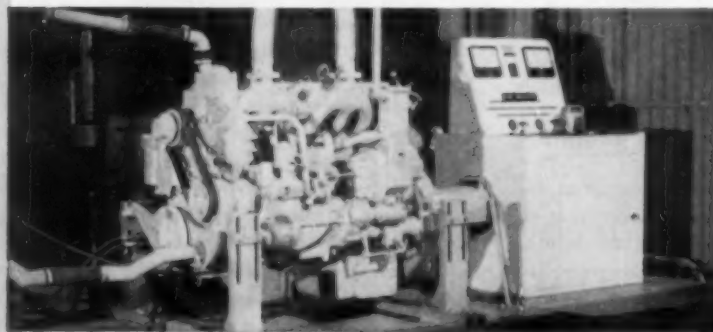
SHEPHERD MACHINERY SAYS:
"With our Clayton Dynamometer
we deliver better engine performance...
happier customer service—
at greater profit!"

Keeping customers happy and coming back to the same place to do business is essential to Jim Miller, General Service Manager of the Shepherd Machinery Company, located in Los Angeles... one of the nation's largest dealers in construction machinery, industrial and marine engines.

"With our Clayton Engine Dynamometer—which we purchased in June 1953—we are certain that we're making available to our customers the highest possible standards of service, and at a profit to us.

"A Dynamometer offers many advantages," states Jim Miller, "but most important to us has been the ability to run-in and accurately test all rebuilt engines... This has practically eliminated costly warranty field service trips and, of course, vastly improved customer confidence in our workmanship... This alone means thousands of dollars a year to any engine distributor."

Let a Clayton representative show you how a Clayton Dynamometer will pay for itself out of savings alone.



FEATURES OF CLAYTON DYNAMOMETERS

- Designed and built for "running-in" rebuilt gasoline and diesel engines.
- Gives complete on the road or job performance data in terms of horsepower or torque and RPM.
- Torque loads are maintained indefinitely or changed at will to fully test any engine.
- Engine adjustments on the stand are simple to make.
- All models handle either right or left hand rotation.

Sirs: Please send us more information on the complete line of Clayton Dynamometers without any obligation to us.

NAME _____ COMPANY _____

ADDRESS _____ CITY _____ STATE _____

OUR BUSINESS IS _____ We handle _____ engine repair jobs a week.

Send to: **Clayton MANUFACTURING COMPANY**
NORTH TEMPLE CITY BLVD., EL MONTE, CALIFORNIA

Machine Load Control

This new Machine Load Control is designed to protect machinery and equipment through automatic shut-off, automatic warning, and/or continuous on-off automatic operation. In its most comprehensive form, the control protects against overload, underload, no-load and phase failure (single phasing). It is engineered with two separate contact ammeters, each equipped with an Indicating Pointer, activated by a current transformer connected in one of the motor leads. Responsive to the current, the Indicating Pointers move identically across the two dials, monitoring and displaying continuously the load on the drive motor. Each ammeter is equipped with Adjustable Limit Pointers. These, when contacted by the Indicating Pointer, actuate the warning and shut-off mechanisms. Simpler forms of this control (one ammeter) are engineered for warning or shut-off for both overload and underload—no-load situations, or for underload—no-load protection. Phase failure protection is also available and automatic on-off operation can be provided.

Tiptronic, Inc., Chagrin Falls, Ohio manufacturers of these electro-mechanical controls, engineered for specific industrial applications, has issued a two-page bulletin (AC-6) describing this recently developed Machine Load Control, designed to protect machinery and equipment through automatic shut-off, automatic warning and/or continuous on-off operation.

ITS NEW

Gas Compressor Units Bought

As part of its expansion program to deliver an additional 285 million cu ft of gas per day into Southern California, the El Paso Natural Gas Company has purchased eight Worthington Turbo-Uniflo engine compressors for transmission service at their new Window Rock, Arizona compressor station. The Worthington engines incorporate a high compression turbo-charged design together with a pulse-generator type ignition system. There are no mechanically wearing parts on the ignition timing system while in operation, thus eliminating any ignition timing change due to wear. A unique feature of the Worthington two-cycle units is the turbo-uniflow turbocharging system capable of delivering full sea level ratings of 2500 hp per unit at 6900 ft above sea level. Worthington's Uniflo scavenging system makes self-sustained turbocharging possible at any speed and load. This results from its ability to time exhaust valve opening and closing at the proper stroke position without interfering with fixed inlet-port timing. The exhaust-driven turbocharger proportions air out-

put with varying speeds and loads, thus enabling it to maintain a more uniform air-fuel ratio than can be obtained with a constant-displacement scavenge pump or blower driven from the engine crankshaft. The Window Rock station, located near the St. Michaels Mission some 20 miles from Gallup, New Mexico, will help increase El Paso's present authorized mainline capacity to 2,673,000,000 cu ft of gas per day. Gas processed by this station will come from both the San Juan Basin in northwestern New Mexico and the Permian Basin in west Texas and southeastern New Mexico. This gas is for the service of California, Nevada and Arizona.

Convincing Cold Test

Within the sub-zero confines of General Motors cold-test laboratories recently, the GM Diesel hydraulic starter provided a convincing performance of its efficiency under adverse weather conditions. The starter was employed to start a diesel engine in a temperature of -25° F. without the aid of external heat. The engine's response to the starter was almost instant with firing impulses generally occurring within 6/10 sec. In advance of the official tests, both the engine and starter were exposed to the sub-zero temperature a week. Thermocouples were used to measure lube oil and coolant temperatures to further determine complete "-25 degree soaking" of the engine prior to each start. Graphs, divided in tenths of second, were used to record engine rpm and the resulting firing pattern that accompanied each test. The starter system, known as the Hydrostarter, employs the power of fluid under pressure to assure positive starts even in extreme weather regions of the World. The recent cold tests were designed to further explore the resistance of arctic temperatures to the starter's normal cranking speed. The starter was mounted on a two-cylinder GM diesel power generator model of the type used extensively in refrigerated railcars and other power applications requiring low kw output. Similar starting tests were performed at the same time on a 290 hp model of GM Diesel's larger six-cylinder "110" series engine. Introduced in 1955, the GM Hydrostarter has been used in the field for some time under varying conditions. Applicable to all GM Diesel engines, it is now being shipped on order with new engines and is being installed in the field on others already in operation. The compact starting unit operates on the principle of oil under pressure turning a simply designed hydraulic motor which in turn starts the diesel. The new system eliminates replacement and maintenance problems common to conventional starters. Its efficiency is not affected by temperature, humidity or altitude.

American Air Filter Announces Changes in Field Sales Force

Three changes in the field sales force of American Air Filter Co. have been announced by C. A. Pickett, sales manager. Joe P. Richardson, formerly with the Air Filter Products Department, in the firm's home office, has been transferred to AAF's Minneapolis branch office. Stanley D. Jensen, sales engineer, has been added to the staff of the firm's Denver branch office. Kenneth Hutchinson has joined Albert L. Becker, Albany, N. Y., as a sales engineer. Becker is the Albany representative for AAF's Herman Nelson Unit Ventilator products.

11,460 kw For South Vietnam

Equipment to increase electric power capabilities of South Vietnam some 15 percent has been shipped from General Electric Company's Large Motor & Generator Department. On board a vessel on the high-seas are four 2865 kw diesel-driven generators which will be installed and operating early next year. The units will provide some 11,460 kw of electric power to this nation whose total capabilities are now 74,500 kw. All four units were purchased by the Indochina Water and Electric Co., a French owned concern which has its headquarters in Paris, but which produces and distributes electricity in South Vietnam.

Three of the generators will be installed in a new power plant in Saigon. They are rated 3581 kva, 428 rpm and will generate 6700 volt, three phase 50 cycle electricity. An AQI design, 428 rpm, 5000 volt, 3581 kva unit will generate two-phase 50 cycle electricity at the utility's present station at Pnom Peuh. Special barging and trucking arrangements will be needed to deliver the unit since roads and the river cut into North Vietnam. All four of the generators will be powered by Worthington SW-14, 16 cylinder, V-type, supercharged diesel engines which will develop 4000 hp at 428 rpm. Generators were ordered through International General Electric, General Electric Company's Producer Goods Export Dept.

Military Order For Engines

American MARC Inc. has received military and commercial contracts amounting to approximately \$600,000 for diesel engines and spare parts. Denis Kendall, president of the California manufacturer of diesel engines and generators has announced. The contracts call for production of 566 light weight, air-cooled 1-cylinder, 6½ hp Model AC-1 diesel engines for the U.S. Defense Department, and 44 engines of the same type plus spare parts for Midwest En-

gineering Co. of Tulsa, Oklahoma. The contracts are scheduled for completion by June, 1959. The U.S. Defense Department order is an addition to the recent \$2,000,000 order which was placed with the company. The Defense Department will use the American MA RC engines, as portable power packages and prime power for electronic installations. In making the announcement, Mr. Kendall said that in addition to the company's military orders, commercial orders are being received at an accelerated pace, necessitating production on a two-shift basis. In line with this, he said, much progress has been made in setting up distributors and dealers on a nation-wide basis. The company's backlog of unfilled orders now stands in excess of \$3,600,000 compared with \$350,000 a year ago. Since January 1, 1958, the company has booked orders totalling approximately \$3,500,000.

Research and Development Appointments

Two appointments in the Research and Development Department have been announced by Jules Kovacs, vice-president in charge of research and development at Purolator Products, Inc., Rahway, New Jersey. John T. Kukowski has been appointed Acting Supervisor of the Research Laboratory and John Van Lier Acting Supervisor of the design section.

D. W. Smith Joins Yates-American

Yates-American Machine Company announces the appointment of Donald W. Smith as National Sales Manager of the Heat Transfer Products Division. Mr. Smith, a native Chicagoan, has a background of many years' experience in OEM sales, the last 10 of which have been in heat transfer products. He attended Armour Institute, now Illinois Institute of Technology, and is a member of the Society of Automotive Engineers. Mr. Smith's appointment is keyed to a current program of expansion in the Yates-American Heat Transfer division. A broad dealer organization is being developed with the addition of representatives in the major marketing areas of the U.S. The division, now in its 30th year, has expanded its operation to include a complete line of heat exchangers as well as radiators for diesel cooling. Recent additions of stainless steel and steam fixed bundle designs give Yates-American a full range of heat exchangers for all applications.

Adds Diesels to Fleet

Jones Motor, Inc., of Spring City, has announced the purchase of 35 Mack diesel tractors for use in its transport fleet.

Oil Field Distributor

An arrangement whereby Wilson Supply Company will distribute the complete line of Oilwell drilling equipment and the Witte line of oil field engines in the domestic territory served by its 20 branch stores and nine district sales offices was announced jointly recently by Fred F. Murray, president of the Oil Well Supply Division of United States Steel, and Wallace D. Wilson, president of Wilson Supply Company. "Addition of the Oilwell product lines represents an important expansion of our oil field service," Mr. Wilson said. Based at Houston, his firm operates principally in the Gulf Coast of Texas and Louisiana, with branches also in East Texas, West Texas, and New Mexico. The Oilwell line of drilling equipment is designed for a broad range of depths and drilling conditions such as are typical of the territory Wilson serves. The Witte oil field engines are manufactured by Oil Well Supply's Witte Engine Works at Kansas City, Mo.

Sales Department Reorganizes

Allison Division of General Motors has reorganized its Transmission Sales Department to provide for an on-highway sales staff as well as the existing off-highway group. J. A. Lane, manager of sales and contracts, Transmission Operations, has announced the appointment of John K. Knighton as assistant sales manager for on-highway equipment. A staff of sales engineers is being formed to expand customer contacts on the Allison fully-automatic transmissions for medium and heavy-duty on-highway trucks, supplementing the sales programs of Chevrolet, Dodge, Ford and GM Truck & Coach for this product. Mr. Knighton came to Allison with an extensive background of sales management, and has been directing the on-highway program since July, 1956.

The off-highway sales and service groups will be directed by Horace N. Roberts, assistant sales manager for off-highway equipment, who has been in charge of these two sections since 1953. Mr. Roberts has been with the Transmission Department since its formation in 1945 and has held a variety of engineering, service and sales assignments. The off-highway sales group will continue to serve the construction, material handling, mining, logging, oil field and other commercial activities as in the past.

New Nordberg Bulletin

A 16 page bulletin describing Nordberg Radial engines, two-cycle diesel, spark-ignition gas and Duafuel, is now available from Nordberg Manufacturing Company, Milwaukee 1, Wisconsin. The

newly revised two color bulletin, No. 200A, describes recent engineering and design features which includes supercharging of the spark-ignition Radial engines for an increase in rating of approximately 50 percent over normally scavenged engines. A schematic drawing helps to describe the relatively minor and simple modifications required to change from a normally scavenged to a

supercharged engine. Installation photos include a view of part of the world's largest internal combustion engine plant where a total of 475,000 horsepower is produced with 220 normally scavenged and 22 supercharged Nordberg Radial engines. The new bulletin describes the space saving features of Nordberg Radial engines. Schematic drawings vividly show the simple foundation and mini-

mum building requirements when installing ac generators, vertical water pump plants and vertical centrifugal pump drives. The versatility of Nordberg Radial engines is quickly noted for these and similar applications. Cut-away photographs and line drawings clearly show the inner workings and detailed assembly of the engines.

ITS NEW

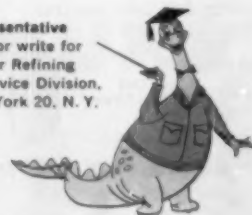
Pistons...



Oil... and saving money

The longer your pistons work before need of ring replacement—the less your cost of operation. Sinclair Rubilene® Oils have the reputation for giving longer service to cylinders, rings and other vital parts. Refill with Rubilene now. Next time management asks how you've cut costs, tell them you've switched to Sinclair—and show them the results.

Call your Sinclair Representative for further information or write for free literature to Sinclair Refining Company, Technical Service Division, 600 Fifth Avenue, New York 20, N. Y. There's no obligation.



SINCLAIR Rubilene® Oils

Jeta Power Equipment Division News

Howard C. Beyer, well-known engineer and administrator in the electric generating equipment field, has joined Jeta Metal Fabricators, Inc., as general manager of the company's newly organized Power Equipment Division, it was announced recently by Anthony Spardini,

company president. Mr. Beyer was formerly general manager of Atlantic Diesel Manufacturing, Inc., and executive vice president of International Ferment Machinery Company, Inc., both manufacturers of engine-generating plants and pumping units. Qualified as both a mechanical and electrical engineer, he holds membership in the Society of Automotive Engineers, American Society of

Naval Engineers, Inc., and the American Institute of Management. In the past, Mr. Beyer has been active on the various standards committees of the SAE.

Aeroquip Opens Dallas Plant

Installation of new plant facilities in Dallas, Texas, has been announced by

Aeroquip Corp., Jackson, Mich. Announcement was made by Peter F. Hurst, president. Aeroquip formerly had a warehouse in the Dallas area for servicing industrial customers. The new plant will serve both the industrial and aircraft markets. Including offices, the plant has 10,000 square feet of floor space. Complete facilities will be available for assembly, proof test, and inspection of hose assemblies. Air Force inspection is also available for hose assemblies supplied on military contracts. Manager of the Dallas Plant is Clyde Stratton. Roger Leuba, formerly of the engineering department at Aeroquip's Jackson Plant, will direct the plant's aircraft operations. Address of the Aeroquip Dallas plant is 9105 Sovereign Row, P.O. Box 35463, Dallas, Tex. Telephone number, FLEetwood 7-6391. TWX no., DL-156.

3200 kw Diesel Generator Unit For Venezuela

Preparations are underway in Barquizimto, Venezuela, mid-way between Caracas and Maracaibo, to install a 3200 kw generator shipped from General Electric Company's Large Motor & Generator Department, Schenectady, N. Y. The ATI type generator is rated 4000 kva, 327 rpm, 4160 volt, three phase 60 cycle and will be driven by a Cooper-Bessemer Corp. LSV-16-GDT, turbo-charged engine which can use oil, or a combination of gas and oil, for fuel. The Barquizimto power plant is one of the oldest diesel-electric installations in Venezuela and currently has a capability of 18,000 kilowatts of electric power generation. Generators were ordered through International General Electric, General Electric Company's Producer Goods Export Department.

Oakite Appoints Basch Marketing Vice President

J. Justin Basch has been appointed to the new position of marketing vice president of Oakite Products, Inc., now in its 50th year as manufacturers of industrial cleaning and metal treating materials. Mr. Basch, formerly vice president for research and product development, will now be responsible for sales, engineering, advertising, and marketing research as well. A graduate of Massachusetts Institute of Technology, Basch, who joined Oakite in 1925, was for many years Philadelphia division manager of the firm. He was elected to the board of directors in 1948 and became vice president in 1956. He has been responsible for product development since 1953. Mr. Basch is a member of the American Chemical Society, the American Ordnance Association, and the Franklin Institute of Philadelphia.

IN UNATTENDED AUTOMATIC STATIONS...

You can forget about dirty air

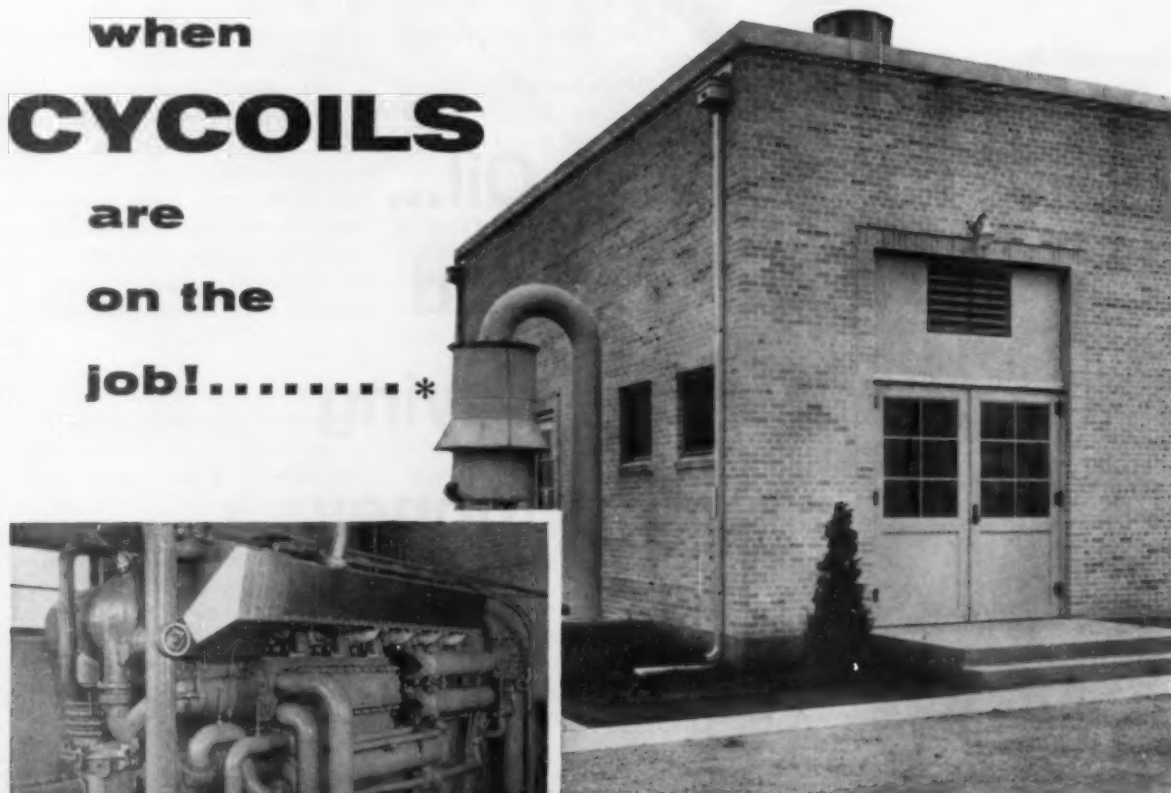
when

CYCOILS

are

on the

job!.....*



* An AAF Type W Cycoil protects the air intake for the 800 hp. Alco diesel engine at this unattended pumping station of Great Lakes Pipe Line Company near Topeka, Kansas.

Automatic pumping stations, which are completely unattended, are becoming more and more common in the petroleum industry. Here, too, AAF intake filters are on the job helping keep the wheels of automation in operation.

All equipment for these stations is selected on the basis of continuous, round-the-clock service, with an absolute minimum of maintenance. AAF Cycoil oil bath filters clean intake air—protect the valuable engines, which are the heart of the system.

Cycoils do their job with practically no maintenance. Every Cycoil is automatically self-cleaning—with no moving parts. The only maintenance necessary is the periodic removal of sludge from oil reservoir.

Whether your operation is automatic or not, you need this same type of positive protection. And—whatever your need in clean intake air, AAF has the right filter—engineered to save you maintenance dollars. Write today for bulletins, containing full information.



American Air Filter
COMPANY, INC.

Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.

Type CMS
Multi-Duty Filters



Type G Pipeline
Air Filters



Type OCH
Intake Air Filters



Cycoil Oil Bath
Air Filters



BETTER AIR IS OUR BUSINESS

Gulf Coast Diesel

Notes

By Don Taylor

CREOLE Engineering Corp., 7728 Long Point Dr., Houston, is Cooper-Bessemer's new, wholly owned manufacturing and engineering subsidiary. This new company will initially package and pre-pipe gas engine compressors such as the GMDX gas-gathering units currently being marketed by Cooper-Bessemer throughout the world, but formerly packaged by other companies. E. L. Miller, president and general manager of C-B has named T. E. Kraner as president of Creole. Kraner was formerly district manager of Cooper-Bessemer's Venezuela office and, more recently of the New Orleans office.

ALL the main gas engines on Argentina's nationalized YPF natural gas pipe line will be Clark TLA-6's manufactured in France according to Fish Engineering Corp. of Houston, designer of the system. Initially there will be four compressor stations on the line requiring a total of 18 of the 2000 hp engines.

INTERNATIONAL Pipe Line Co. of America has purchased 36 Bucyrus-Erie backhoes, cranes and draglines, models 15 B and 22 B's from Browning-Ferris Machinery Corp. of Houston to use in constructing the new Argentina pipe line system. The units are powered with Caterpillar diesels models D-318 and D-315.

EDGAR Brown Jr. of Orange, Tex. recently accepted delivery of a 135 kw generator set from Stewart & Stevenson Services, Inc. of Houston. The set will be used as a standby power supply for Brown's home. It's a Stewart & Stevenson model 6 GD-135, powered by a General Motors series 71, model 6030C diesel.

OILWELL Supply Division of U. S. Steel purchased a Stewart & Stevenson oilfield utility set consisting of a General Motors series 71 three cylinder model 3030C diesel, a 30 kw, ac generator, a 300 amp rectifier for welding, an electric motor driven 2 x 3 R-11 Mission water pump and a Westinghouse 3 YC air compressor.

PERFORATING Guns Atlas of Houston bought a General Motors series 71, four cylinder model 4030C diesel from Stewart & Stevenson to power the draw works on one of its oilwell servicing units.

ROBINSON Trucking Co. of Odessa, Tex. purchased a 175 hp JT-6-B Cummins diesel from the Cummins Sales &

Service Co. of Ft. Worth. Dale Meyer Trucking Co. also of Odessa bought a similar unit.

A. H. HELBERT of Albuquerque, N. M. bought a Cummins NHBS from Cummins Rio Grande Sales & Service of Albuquerque, N. M.

CHICAGO Procurement Office of the

U. S. Army Corps of Engineers ordered 131 General Motors diesel driven 45 kw, 400 cycle ac generator sets from Stewart & Stevenson. The power for the units will be GM series 71, 3 cyl. diesels.

DEPARTMENT of Commerce, Civil Aeronautics Administration, Fort Worth, Texas, has bought two Stewart & Stevenson model 110GD-110C, 100 kw, ac, gen-

erator sets, each powered by a series 110, model 62406 General Motors diesel.

HAYS Aircraft Company, Birmingham, Alabama, has obtained from Stewart & Stevenson Services, Inc., Houston, four Stewart & Stevenson special 30 kw, ac, generator sets, each driven by a series 71, 3-cylinder, model 3030-C General Motors diesel.

IN AN EMERGENCY

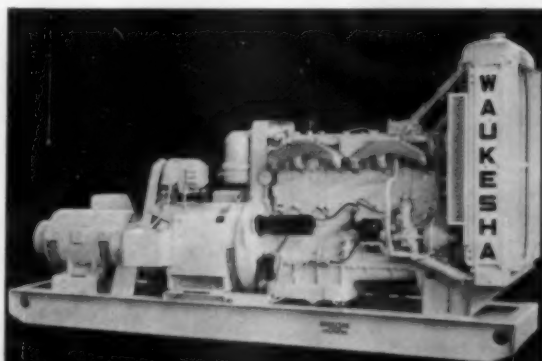
AUTOMATIC, IMMEDIATE

electric

SERVICE

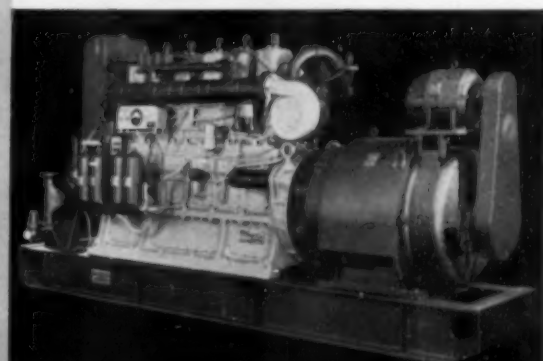
For—essential lighting . . . surgery suite . . . laboratories . . .

X-ray . . . dietary . . . boiler rooms . . . emergency elevators . . . and ancillary equipment



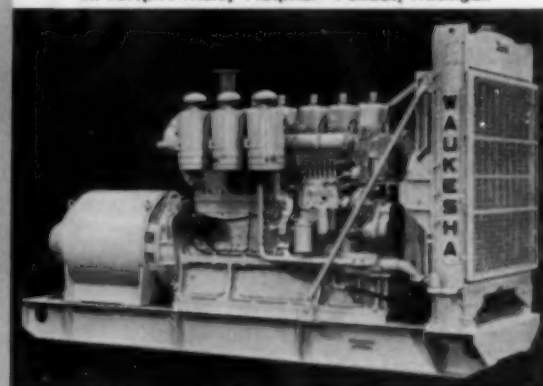
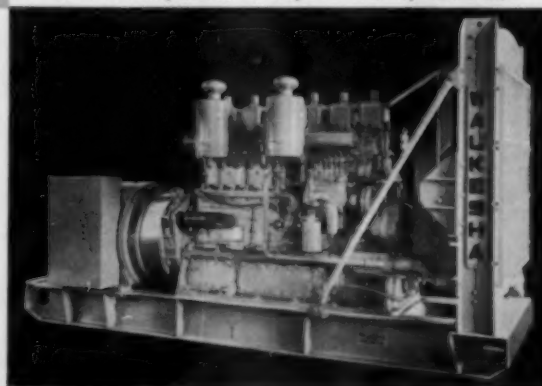
Waukesha Gas Engine with 50 KW and 60 KW tandem generators for St. Catherine's Hospital—Kenosha, Wisconsin

Waukesha Diesel Engine rated at 250 KW for the Fresno County General Hospital—Fresno, California



Waukesha Diesel Engine rated at 300 KW for the Lutheran Hospital—Cleveland, Ohio

Waukesha Diesel Engine rated at 300 KW for St. Joseph's Mercy Hospital—Pontiac, Michigan



WAUKESHA ENGINEATORS®

Developed by over 50 years' experience in building heavy-duty internal combustion engines and electrical equipment, Waukesha Engineators have a world-wide proven record of reliability. Made in Diesel and carburetor fuel models, up to 800 KW capacity. Send today for descriptive literature.

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN • NEW YORK • TULSA • LOS ANGELES

Florida Diesel News

By Ed Dennis

O YEZ, a 67 ft. trawler launched at Diesel Engine Sales, St. Augustine, is powered with the new series E General Motors 6-110 diesel engine rated 210 hp at 1800 rpm. The 4.5:1 hydraulic gears are Allison. A 3 bhp Petter diesel en-

gine drives the 1500 watt Win-power auxiliary generator and a Jabsco pump. Ocean Products of Tampa are the new owners.

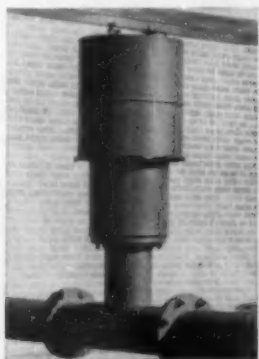
AT Cross Key Station, the Florida Keys Aqueduct Commission will build a water pumping station to house two model 40-SX-8, turbocharged 8 cyl. Superior diesel engines. The engines are rated

487 hp at 600 rpm and will drive Allis-Chalmers water pumps through Philadelphia gear increasers model 13-CIS, the input speed is 600 rpm, output speed 1760 rpm.

STEWART and Waldin of South Florida are building another side ditch digger. A D318G turbocharged Caterpillar will power the unit. A D6 tractor frame

and #977 traction and pads will be used.

STANLEY Building Specialties Co., North Miami, leased from the Ryder System an International COE #200 tractor powered with a JT6B Cummins diesel. This 4 cycle 6 cyl. engine is rated 175 hp at 2500 rpm, a Fuller T76 Road-Ranger transmission is also included.



On the job DA filter provides rugged, compact mounting on air intake to industrial air compressors.

AFTER TWO YEARS

*...with no maintenance,
pressure drop increased only .3"
on this Air-Maze filter*

Here's real proof that the Air-Maze DA dry-type filter is one of the most efficient mechanical filters available today for air cleaning application on engines, compressors, blowers and other industrial uses.

After two years continuous duty:

1. Pressure drop through the filter has increased only .3" with no maintenance whatsoever.
2. All inside surfaces are still clean.

Built for use where oil-free air is required, the DA filter provides better than 98% efficiency with particles of 2 micron mean diameter and 100% efficiency with particles 5 microns and larger. Made in sizes from 20 to 6650 cfm. Ideal for service when air velocity varies from one period to another and when vibration is present to help dirt removal.

Write for catalog DA-1056.

The Air-Maze Corporation,
Cleveland 28, Ohio, Dept. DP-10.



Air-Maze DA dry type filter with cover removed. Shows high-grade felt filtering media arranged in deep pleats to provide extended area and armored on both sides by heavy galvanized cloth.

AIR-MAZE

The Filter Engineers

AIR FILTERS • SILENCERS • SPARK ARRESTERS
LIQUID FILTERS • OIL SEPARATORS • GREASE FILTERS

AT Madeira Beach, Clymer Bros., charter boat owners, repowered their 55 ft. *Miss Atlanta* with a pair of General Motors 6-71-E diesel engines and 2:1 hydraulic marine gears. With 30x27 propellers, the vessel makes 15 knots. The engines came from General Engine & Equipment Co. of Tampa.

TINY TIM a 200 ft. menhaden fishing vessel launched at the J. F. Bellinger & Sons shipyard, Jacksonville, has for main propulsion 2 650 hp Deutz diesel engines. Two 40 kw Caterpillar diesel generating sets are also included in the engine room while two 150 hp Cats supply power for the refrigerator compressors and a D 318 Cat diesel drives the 10 in. fish pump. This menhaden fishing vessel is one of the largest in the world and is owned by J. Harvey Smith of the Fish Meal Company.

TWO model DSR-38 Enterprise diesel engines, rated 2532 hp at 360 rpm, at New Smyrna Beach, are now using bunker C oil for fuel. The Elliott ac generators are rated 2250 kva 4160/2400 volts 313/541 amps. Woodward governors and Brown-Boveri turbochargers are used. Due to the large power demands, plans are now in progress for installation of additional generating units.

SHRIMP trawler *Donna Jean* owned by W. O. Driggers, had a model NHCM Cummins diesel engine installed. This 4 cycle diesel is rated 90 hp at 1800 rpm. It has 2:1 Twin Disc r&r gears and was engineered by the Jacksonville Branch of the Cummins Diesel Engines of Florida.

DIESEL Shipbuilding Co. of Jacksonville is building, for the Gulf Atlantic Towing Corp., the 64 ft. *Gatco New York*. Powered with two D375 turbocharged Caterpillar diesels and 3:1 Twin Disc hydraulic r&r gears they will turn 54x38 four blade Doran Southern propellers. Two Caterpillar D311 ac 30 kw 110/230 volt generating sets are also being installed.

REPOWERED from gasoline to diesel is an Auto-Car tractor with an NH180 Cummins rated 180 hp at 2100 rpm, for F. D. Peterman of Jacksonville. A model NHB220 rated 220 hp at 2100 rpm was installed in a TRD30 Mack tractor for I. M. Burgess. Both engines

DIESEL PROGRESS

were supplied by Cummins Diesel Engines of Florida.

CAPE SABLE, the southernmost projection of the U. S. mainland and part of the Everglades National Park, depends on one model 32E14 Fairbanks Morse diesel generating set rated 300 kw 60 cycle 3 phase 2400 volts and one 250 kw 312 kva Fairbanks Morse generating set. Both have Woodward governors. The units came from Auto Marine Engineers of Miami.

AT Jacksonville, the twin screw 40 ft. charter fishing boat, *Something* was re-powered from gasoline engine to model Y 6 cyl. 330 cu. in. Ford marine diesel engines with 2:1 Paragon HF3 hydraulic r&r gears. These engines are marined by Modern Diesel Power Co. of Tampa.

AT Indiantown, the Norman Hailes Dairy had a model D326 Caterpillar diesel electric set installed with a 100 kw Cat 110/220 volt generator, from Shelley Tractor & Equipment Company of Miami.

ELLIS Diesel Sales & Service of Fort Lauderdale repowered the 65 ft. yacht *Bubbles* with three 6 cyl. series 71-B General Motors diesels. These engines have a rated shp of 235 each at 2300 rpm with "80" injectors and use an Allison hydraulic straight drive through 1:1.5 Huckins V drive. A 3 kw model Onan diesel generating set was included.

MODEL 8-7300 General Motors diesel engine with 4.5:1 Allison marine r&r gears rated 311 max. hp at 2300 rpm or 227 cont. hp at 1800 rpm was installed on the 65 ft. shrimp *Cumberland* launched by Diesel Engine Sales at St. Augustine and owned by Alvin Dickey of St. Marys, Ga.

SQUARE Deal Machinery of Orlando delivered to the Craggs Construction Co. of Ocala, two Allis Chalmers T. S. 260 motor scrapers with 14 yd. heaped capacity. These are powered with Allis Chalmers TD844 diesel engines each rated 200 hp at 2000 rpm.

THREE Mack B833 off highway tractors powered with NT6 250 hp Cummins diesels were sent to Grand Bahama Island by the Owens Illinois Glass Co. to be used in lumber operations there.

RECENT Cummins dieselized construction equipment added to the north Florida area included a model H. O. Hough Payloader with a JN6BI Cummins and an Allison 3.5:1 transmission to Volusia County Commission; two Galion road graders with model JN 6BI Cummins diesels to Seminole County Commissioners; and the City of Jacksonville took delivery of a Huber-Warco

motor grader with a JN6BI Cummins diesel engine rated 130 hp at 2500 rpm.

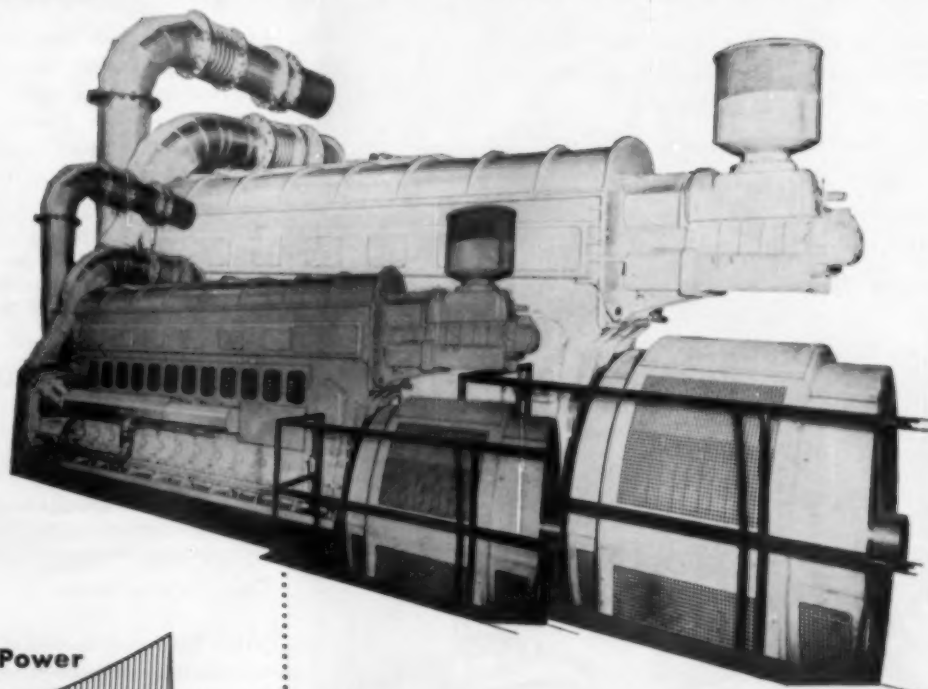
THREE International crawler tractors were shipped to Steve Calder of San Jose, Costa Rica. Two were TD18 tractors rated 105 drawbar hp and one TD tractor with a 66 net hp International diesel. These are to be used on a 56,000 acre coffee and cattle plantation; from

Florida Georgia Tractor Co., of Miami.

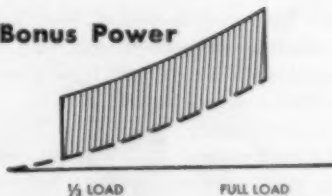
SOLD to Dr. Silas Capriles of Caracas, Venezuela, a 40x12 cabin cruiser by Chris Craft of Pompano Beach and powered by two General Motors 4-71 diesels (4087-4088) Paragon 1.5:1 r&r gears. Texaco Urna HD30 lube oil and Texaco #2 cetane rated 53 fuel oil were used on the trip to Venezuela.

HERE IS IMPORTANT INFORMATION!
The completely new 1958 edition of the **DIESEL ENGINE CATALOG**, Volume 23, is now available. If you design, purchase, sell, operate or service diesel, dual fuel or gas engines, the Catalog is essential to you. This giant, 400 page, 10½" x 13½", fully illustrated reference book has been revised, rewritten and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs \$10 postpaid plus California sales tax where applicable. Send checks or company orders to **DIESEL ENGINE CATALOG**, 816 N. La Cienega Blvd., Los Angeles 46, Calif.

50% More Power with Fairbanks-Morse TURBOCHARGED OPPOSED-PISTON DIESEL

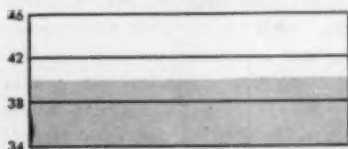


Bonus Power



Auxiliary blower is automatically declutched at loads above approximately 1/3 rating to deliver more usable power at the flywheel.

Increased Thermal Efficiency



Turbo-charged Fairbanks-Morse Model 30TD-8 1/8 Opposed Piston Diesel is approaching a new high of 40% efficiency.

New Efficiency...New Power...New Fuel Savings For Marine and Stationary Applications

The industry's most compact, simple, and dependable diesel—the Fairbanks-Morse Opposed Piston—is now turbo-supercharged! Fuel savings from 5% to 10% are effected on full-load operations—even more on part loads. And 50% more power has been added. At 900 rpm, for example, it is conservatively rated at 300 hp per cylinder. Yet it occupies virtually the same space as the non-supercharged version...weighs only about 8% more. Look at the advantages in this usually low size and weight per horsepower.

Stationary installations—save on foundation and building costs.

Commercial marine use—more power, speed, fuel and cargo capacity.

Portable operations—save with most compact power available today.

Greater power is available at higher altitudes because the engine is less sensitive to atmospheric pressure. Oil and water cooling requirements show almost no increase at the higher output. It's all possible with careful matching of system and engine. Divided manifolds permit use of exhaust pulses with no pressure cancellations. Engine-driven auxiliary blower provides scavenging air up to 1/2 load—declutches above this figure to make additional power available at flywheel. For full information write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.



FAIRBANKS-MORSE

a name worth remembering when you want the BEST

DIESEL AND DUAL FUEL ENGINES
DIESEL LOCOMOTIVES • RAIL CARS
ELECTRICAL MACHINERY • PUMPS
SCALES • HOME WATER SERVICE
EQUIPMENT • MAGNETOS

Mid-West Diesel News

By L. H. Houck

POWER setup on one of the biggest dump trucks in the world designed and built by Western Contracting Corp., and used on Oahe Dam at Pierre, S. D., which hauls 80 tons, consists of two 375 hp Cummins diesels, Model NHRS-600.

They drive the 18.00 x 33 in. 32 ply drive tires through a Euclid driveshaft and universals with a Euclid differential by using two Allison TCG-604 torque converters and two Allison TG-607 transmissions. The huge dumper uses 8 of the big tires on the driving axles.

FIRST imported diesel to be installed

on a combine is a one cylinder Deutz diesel purchased from Crossfield and Nicholson Co., St. Paul, Minn., and replacing a 4 cylinder gasoline engine. Drive is V-belt. Buyer was Oscar Milchewsky, Watertown, Minn. Milchewsky said the new diesel aircooled engine would slip the belt before it would stall where his old engine would stop in heavy going.

PORTER-DEWITT Const. Co., Poplar Bluff, Mo., has a new Caterpillar D9 with Twin Disc torque converter working on its Interstate 44 job near St. Louis. Rig is equipped with push plate in front for push-loading a fleet of Euclid scrapers with GM 6-71 diesels, and a ripper on the rear. Sale was made by Fabick & Co., St. Louis.

BATCHING plant combination used by S. J. Groves Const. Co., on the Chicago-Elmhurst, Ill. turnpike consists of a Blaw-Knox with Pioneer conveyor with Caterpillar diesel power. Marion 362 shovel with Caterpillar D13000 loads bank run material into a Caterpillar PD15 side-dump wagon. A Caterpillar D8 stockpiles and sand is loaded with a Hough Payloader with Cummins.

HANSEN Elevators, Storm Lake, Ia. have placed a 170 hp Mach Thermodyne diesel in service with a 10 speed Mack transmission and 10:00 x 20-in. tires on the driving axles.

CUMMINS NH-220 to Claud Peterson, Medford, Wis., for repowering a White tractor, from Cummins Diesel Sales Corp., Hibbing, Minn.

JOHN Linneman, Scottsbluff, Neb., has repowered a Diamond T 723 with a Cummins 175 hp JT-6-B, from Cummins Diesel Sales Corp., Denver.

SHERMAN White Co., Fort Wayne, Ind., has repowered an IHC RD-205 with a Cummins 175 hp JT-6-B from Cummins Diesel Sales Corp., Indianapolis.

LOADING equipment in the Lucky Mac uranium strip pit near Riverton, Wyo., operated by Utah Construction Co., San Francisco, includes an 80-D Northwest 2½ yd. shovel with a Murphy ME 21 diesel; a model 6 Northwest shovel, 1½ cu. yd. with Murphy ME 21 diesel and a P & H Model 655 with a Caterpillar D13000 power plant.

HIRSCHBACH & Sons have added four 923 F Diamond T's to their produce fleet. They are powered with 180 hp Cummins diesels, 5A650 Fuller transmissions and Eaton 18803 driving axles. Headquarters is Sioux City, Ia.

SIOUX Transportation Co., Sioux City,

Ia., haulers of freight between Sioux City and Chicago, have added four 723 Diamond T's to their fleet with 8 speed Fuller RoadRanger transmissions and Timken driving axles.

U. S. ARMY Engineer District, Service Base, St. Louis, have put three new motor boats in service. They are 50x12x6, draw 3 ft., and are powered with a model 8 DAMR-1125 Allis-Chalmers diesel, skin cooled, driving a 40x28 in. three blade propeller through a 2 to 1 reduction gear. Onan diesel-powered ac generator sets supply auxiliary power—3 kw, 115 v, 60 cycle. Units are used mainly for dredge tenders.

CATERPILLAR D9 with straight transmission was purchased by C. F. Basler, Cheyenne, Wyo., from Worthham Machinery Co., Cheyenne.

DIAMOND T coe, with 220 hp Cummins diesel to Earl Holbrook, Yankton, S. D., from Sioux City Truck Sales, Inc., Sioux City, Ia. Transmission is a 10 speed Fuller RoadRanger.

CUMMINS 175 hp JT-6-B to J. W. Tolbert, Waukesha, Wis., to repower an IHC RD-190, from Cummins, Milwaukee.

CASE Terra-trac diesel loader to Dewey-Simpson Stone Co., Harrisburg, Ill., with Case diesel. Model is W-9 on rubber. A Case Terra-trac with Case diesel, a crawler with high lift loader to M. W. Kester, Arlington Heights, Ill., and another with dozer front-end to Huntley Construction Co., Jackson, Tenn.

MACK B61 Thermodyne diesel in a coe with 10 speed Mack transmission to Ted Vanderhull, Altton, Ia., from Sioux City Truck Sales, Inc., Sioux City. Rig drives with 10.00 x 20 tires.

TWO Diamond T's to Layton Gerch, Sioux City, Ia. who hauls freight to Chicago—a 923 and a 723, both with 180 hp Cummins diesels, 5A65 Fuller transmissions and Eaton 18803, two speed driving axles with 10.00x20 tires.

CUMMINS 175 hp JT-6-B to Frank Root, Detroit Lakes, Minn., for repowering an IHC R-195 from Cummins Diesel Sales, Inc., St. Paul.

HERE IS IMPORTANT INFORMATION! The completely new 1958 edition of the **DIESEL ENGINE CATALOG**, Volume 23, is now available. If you design, purchase, sell, operate or service diesel, dual fuel or gas engines, the Catalog is essential to you. This giant, 400 page, 10½" x 13½", fully illustrated reference book has been revised, rewritten and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs \$10 postpaid plus California sales tax where applicable. Send checks or company orders to **DIESEL ENGINE CATALOG**, 816 N. La Cienega Blvd., Los Angeles 46, Calif.

S-N 3900 Series REVERSE REDUCTION GEARS

For high speed, heavy
duty diesel engines

The 3900 Series Hydraulic Gears provide these outstanding features you want and need to get the finest performance from modern diesels in the 200 to 800 HP range.

Simple Compact Design—Saves valuable space, reduces weight, provides easiest servicing.

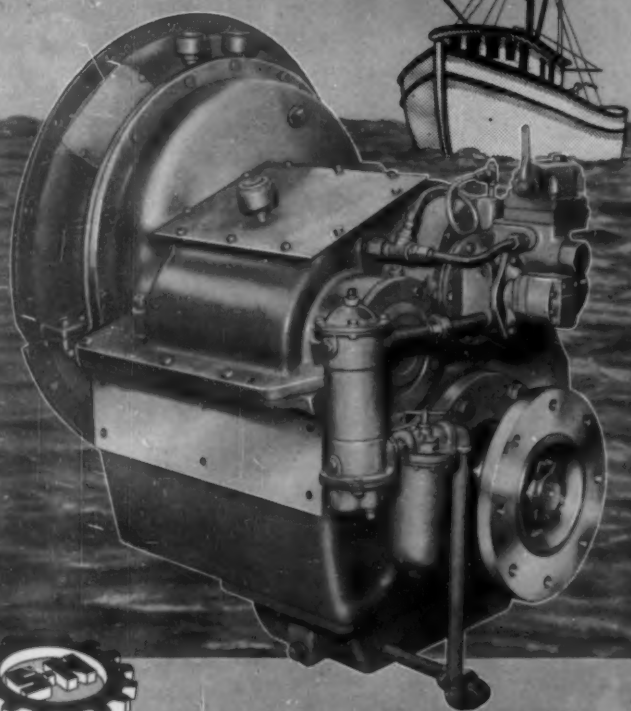
Rugged Construction—Assures long life and complete dependability. Built to take hard usage.

Outstanding Performance—Transmits full load and speed, ahead or astern. No loss of power due to dragging discs.

Additional Features—include low price per horsepower and the widest choice of reduction gear ratios.

For complete information see your S-N distributor or write direct. The Snow-Nabstedt Gear Corporation, Hamden, Conn.

RUGGED



SNOW-NABSTEDT

Transmission Engineers FOR OVER HALF A CENTURY

West Coast News

By James Joseph

INSTALLED in the 63 ton halibut boat *Karen T*, owned by Seattle's Tynes and Anton Moe, a Caterpillar D-337F, turbo-charged, 6 cyl., four cycle, valve-in-head diesel. Sale by Seattle's N C Machinery Co.

NACHES Tavern, Enumclaw, Wash., purchased a model 2-71 GM diesel power unit, operating generator. Sale by Evans Engine & Equipment Co., Inc., Seattle.

REPLACING a gasoline engine in a rock crusher operated by Snohomish County (Wash.) Road District #1, was a GM 4-71 diesel engine.

BURKE & Reynolds Construction Co., of Wilmington, Calif. purchased a Fairbanks-Morse model 45C4 $\frac{1}{2}$, 10 $\frac{1}{2}$ hp, 1 cyl. diesel generating set.

FOR Western Electric Co., Seattle, a Fairbanks-Morse model 45C3 $\frac{1}{2}$ diesel generating set.

PORTLAND'S Pacific Pumping Co. took delivery of a model 4DA-182 Allis-Chalmers diesel close-type power unit and a 2BD-77 diesel, both for pumping operations in eastern Oregon.

INSTALLED in the vessel *Jericho Cruzes* (owned by Santa Catalina Island Steamship Co., Wilmington, Calif.), two GM 4-71s with 1.5:1 reduction, swinging 21x19 props. Sale by Crofton Diesel Engine Co. Inc.

MARTINAC Shipbuilding Corp., Tacoma, has taken delivery of four GM 12003s, tandem twin marine engines being installed in two new U.S. Navy torpedo retriever boats. Trial runs made in August.

TO Mike Criscoula, for his seiner-dragger, *Lemes II*, a GM 6-110 marine engine. Sale thru Bellingham Marine, Inc., Bellingham, Wash.

SUMNER Iron Works, Seattle, has installed its Sumner Torigizer, a machine which makes hay biscuits for cows, with a GM 6-110 diesel power unit.

COLLINS Electrical Co. Inc., Sacramento, Calif. has purchased a 36 hp, model 48A3 $\frac{1}{2}$ -4 Fairbanks-Morse power unit.

AMERICAN Independent Oil Co., San Francisco, has taken delivery of a Fairbanks-Morse 10 $\frac{1}{2}$ hp model 45C4 $\frac{1}{2}$, 1 cyl. diesel engine.

TO Prothero Boat Co., for new 57 ft.

limit seiner *Sierra Seas* operating Alaskan waters, a GM 6-110 marine diesel.

FOR the 68 ft. halibut boat *Aleutian*, fishing Alaska's coast, a GM 6-110 diesel marine engine. Boat is owned by Nels Pederson, Seattle.

SOLD to Eastern Air Lines . . . 40 Garrett AiResearch GTCP 85-91 small gas

turbines (250 lbs.), producing 200 hp for starting Lockheed propjet Electras.

REPLACING two gas engines in Fish and Wildlife Service's 50 ft. patrol boat operating from Ketchikan, Alaska, are two GM 4-51s. Sale by Evans Engine & Equipment Co., Inc., Seattle.

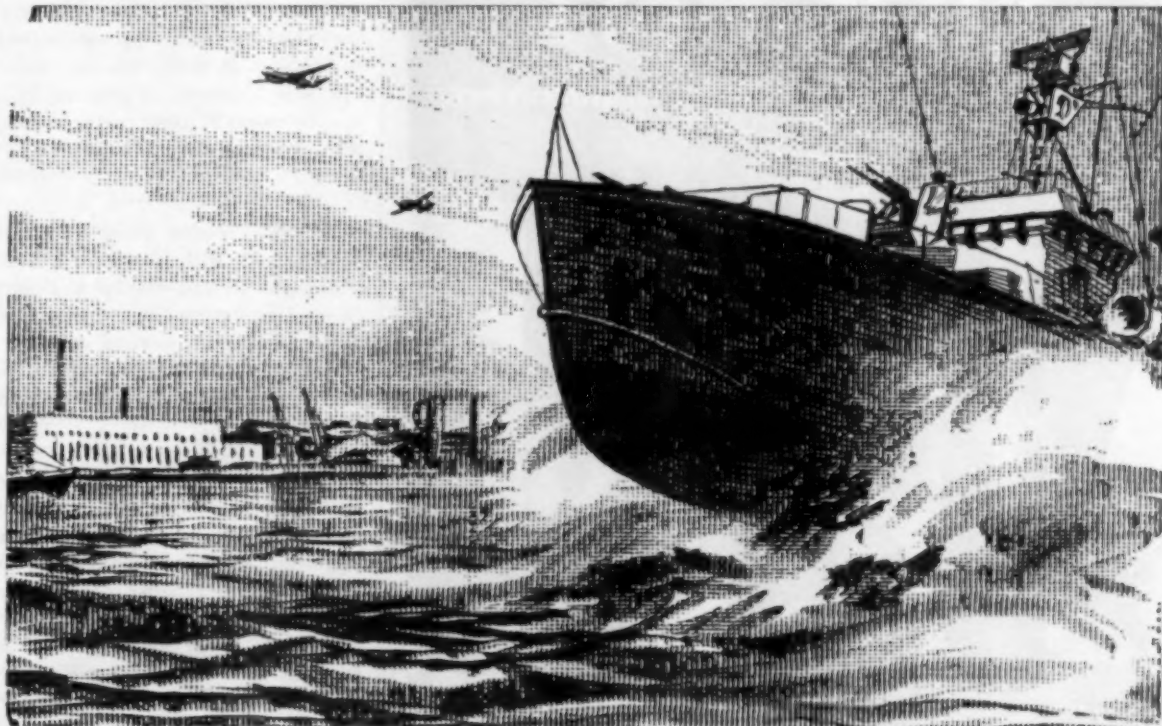
FOR irrigation pumping in Washing-

ton state, a GM 2-71 purchased by Seattle's Piston Service Wholesale Inc.

TO Alaska Barge & Transport Co., Kotzebue, Alaska, for 55 ft. steel tug *White Bear*, two GM 6-110 marine engines delivering 325 hp at 2000 rpm.

POWERING the *Sally S*, 74 ton, 69.5 ft. tug working out of Seattle is a Caterpillar D-342 diesel.

MORE POWER AT LOWER COST—



THIS IS NAPIER

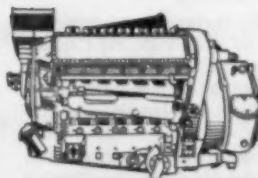


GAZELLE 1200 3000

s.h.p. Free Turbine:

designed for strenuous duty and long service between overhauls.

Chosen for R.N. and R.A.F. helicopters. Allows new flexibility in helicopter design. Its simplicity means economical and speedy maintenance.

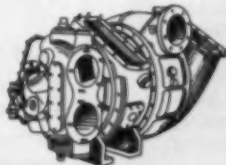


DELTAIC 9 or 16 cylinder Diesel: engine for merchant ships. Powers fast patrol boats and mine-sweepers of many navies, police and passenger launches and the world's most powerful diesel electric locomotive. Deltaic Diesel Engines are designed for power outputs from 635 to 1,100 h.p.

ELAND 3000-6000

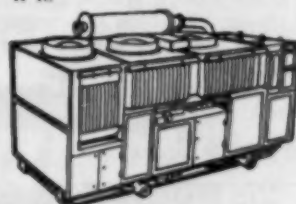
s.h.p. Turbo Prop:

heralds a new era of economy for the airline operator and cheaper fares for the air traveller. The Eland powers the Canadair 540 Airliner, the Fairley Rotodyne and the Westland Westminster Helicopter.



TURBO BLOWERS:

available in seven sizes for diesel engines afloat and ashore. Napier blowers give maximum power increase with low fuel consumption. Now in service in 84 countries.



DELTAIC COMPACT

A compact source of power, easily transportable to normally inaccessible places, comprising Deltaic Diesel engine plus generator, radiators, fuel tanks, pumps, etc. Weight 35,000 pounds. Envelope 34 x 8 x 11 ft.

NAPIER ENGINES INC.

Suite 909, Dupont Circle Building, 1346 Connecticut Avenue N.W., Washington 6, D.C. Telephone: North 7-9300

A subsidiary of D. NAPIER & SON LIMITED · LONDON · ENGLAND

Partners in Progress with The ENGLISH ELECTRIC Company Ltd.

CRC 134

69

Michigan-Ohio News

By Jim Brown

U. S. ARMY Engineer District in Detroit, awarded a total of eleven construction contracts for military and civil works throughout the state of Michigan amounting to \$3,184,289 recently, it was announced by Colonel Peter C. Hyzer,

District Engineer. Work on all contracts is expected to get underway immediately.

TWO of the new Bucyrus-Erie 30B shovels are working a tile-laying job at Lansing, Michigan, one for Mead Brothers and one for Anderson Excavating Co. of Lansing. Both shovels were delivered by Wolverine Tractor and

Equipment Co. of Detroit and Grand Rapids; the Anderson machine is powered by an International UD 525 engine.

GINO IANNI Construction Co. of Detroit has accepted delivery on an Allis Chalmers model HD6B crawler with a 6BE hydraulic dozer blade. The new crawler will be broken in on a highway re-dressing project near Saginaw, Mich. Sale was made by Earle Equipment Co. of Detroit.

COMBINATION pull-shovel and dragline Northwest model 95 was recently sold to Ray D. Baker Co. of Detroit. The new Northwest is powered by a Murphy model 21 diesel engine and was purchased from Cyril J. Burke, Inc. of Detroit.

HOLCOMB Marine Construction Co. of Montague, Mich. purchased a Cummins model VT-12-I (600 hp) to drive a 12 in. Amsco pump on a dredge. The dredge is presently working on a river project in Grand Haven, Mich. The engine supplier is Cummins Diesel Michigan, Inc.

BOARD of Directors of Lake Shore, Inc. Iron Mountain, Mich., has announced the election of B. W. Reeve as president, succeeding the late F. A. Flodin. Reeve, a native of Nebraska, joined Lake Shore in 1947 as manager of the Service and Supply Division. In 1949 he was elected vice-president in charge of sales and in 1950 became director.

BLUE Water Excavating Co. and Flint Road Builders each recently acquired a new Galion T-600 Road Grader from Wolverine Tractor and Equipment Co. of Detroit and Grand Rapids, Mich. In order, they are powered by a Cummins diesel and by an International Harvester diesel engine.

WILLIAM Velting & Sons of Grand Rapids, Mich. has accepted delivery on a Koehring 305 dragline equipped with a power boom and GM 3-71 Detroit diesel engine. Earle Equipment Company of Detroit made the sale.

TWO Hercules model DD 226 diesel engines were recently delivered to the Army Ordnance Corps in Detroit. Sale was made by Cyril J. Burke, Inc. of Detroit.

N. & K. Cartage Co. of Muskegon, Mich. are installing a "trial" Cummins model NH 220 diesel engine in one of their model 660 GMC trucks. The Cummins distributor is Cummins Diesel Michigan, Inc.

MARION Power Shovel Co. announces

the appointment of C. D. (Cal) Torr as a divisional sales manager assigned to the company's central sales district. Mr. Torr makes his headquarters at 4865 Halbert Drive, Milford, Mich., and represents Marion in the State of Michigan with the exception of the Upper Peninsula.

GUS THOMS of Marlette, Mich. is now using a new International Harvester TD20 with an IH hydraulic bulldozer, purchased from Wolverine Tractor and Equipment Co. in Detroit.

ALLIS-Chalmers model HD6G diesel Tracto-Loader has recently been delivered to McLouth Steel Corp. of Detroit. The Tracto Loader was purchased from Earle Equipment Co. of Detroit and will be used for unloading Great Lakes freighters.

FOUR Yaeger model 125 cfm compressors mounted on Ford Major diesel tractors were sold to Ford Motor Co. for miscellaneous plant maintenance work. The sale was made by Cyril J. Burke, Inc. of Detroit.

LEELANAU County Road Commission at Leland, Mich. have commissioned the Oshkosh Motor Truck Co. to rebuild two of their dump trucks. While they are being rebuilt they will be converted from gasoline to Cummins diesel. Engine suppliers are Cummins Diesel Michigan, Inc.

EUCLID Division of General Motors Corporation at Cleveland, Ohio announces an increase in truck capacity from 18 to 21 cu. yd. for model S-18 scraper. Heaped load is 24 cu. yd. at 3:1 and 30 yd. at 1:1 slope.

ORVIN HANSON of Warren, Mich. recently bought a new International Harvester TD 6 'dozer from Wolverine Tractor and Equipment Co. of Detroit and Grand Rapids, Mich.

ALLIS-Chalmers model HD6G tractor equipped with a TS-6 Tracto-Motive shovel was sold to the Argersinger and Morse Const. Co. of Ann Arbor. Distributor is Earle Equipment Co. of Detroit.

COMBINATION 1-yd pull shovel and dragline Northwest model 41 powered by a Murphy 12 diesel engine has been purchased from Cyril J. Burke, Inc. of Detroit by Rocco Ferris, also of Detroit.

THOMAS MYERS of Flatrock, Mich., a broker for Rogers-Cartage Co. of Detroit is replacing the present engine in his model LFTID Mack truck with a Cummins model NH-220 diesel engine. The engine was purchased from Cummins Diesel Michigan, Inc.



Figure 1554A-4L strainer basket available in brass, steel or stainless steel screen. 8 x 8 to 100 x 100 inches.

Figure 1554-4L and Figure 1490DD-4L strainer shells are identical. Strainer baskets shown are interchangeable in this model.

Figure 1490CN-4L basket. Star-shape provides 20% more free screen area in this size. Available same metals, mesh as Fig. 1554A.

Nugent pipe line strainers can materially reduce your maintenance labor costs and hold down-time to a minimum. Unlike most strainers of this type, both the Nugent round basket and star-shaped extended area strainers, shown above, catch and hold their accumulation of foreign solids in the interior of the strainer basket.

Dirty liquid, under pressure, enters the strainer through the bottom inlet. It is then propelled upward through the center tube assembly. Emerging at the top, the liquid travels outward and downward, through the mesh of the basket and to the side outlet. In this manner, foreign solids are trapped *inside* the strainer basket which is then easily lifted from the outer shell for cleaning. A clean spare basket may be immediately substituted and the dirty basket cleaned when convenient.

Most other strainers direct the flow of dirty liquid from the exterior to the interior of the basket. Thus, foreign matter is trapped between the outer shell and the basket; not inside. When these dirty baskets are removed for cleaning, it is almost impossible to prevent some foreign matter from flowing back to the inlet and outlet piping. This type also requires scraping and cleaning the interior of the outer shell, a time consuming task that increases down-time.

Nugent strainers can save you time and money. For full details write for Bulletin 6.



W. W. NUGENT & CO., INC.
3441 CLEVELAND STREET, SKOKIE, ILLINOIS

OIL FILTERS • STRAINERS • TELESCOPIC OILERS
OILING AND FILTERING SYSTEMS • OILING DEVICES
SIGHT FEED VALVES • FLOW INDICATORS

REPRESENTATIVES IN
PRINCIPAL CITIES

Inland River Reports

By A. D. Burroughs

MORE than a minor ripple has been created by the new un-named vessel completed at Missouri Dry Dock and Repair Co., Cape Girardeau, Mo. The 153 x 34 ft. twin-screw craft boasts many patent-pending underwater features. The air-conditioned engineroom carries GM (Cleveland) engines.

CURRENT construction in New Orleans includes a 600 hp twin-screw tug, 60 x 21 ft. for stock at Equitable Equipment Company.

UNDER construction at Barbour Metal Boat Works, St. Louis, is the new boat ordered by Allegheny County Sanitary Authority, Pittsburgh. The 45 x 135 ft. single-screw vessel will have 220 hp supplied by a GM 6-110.

A new all-steel towboat, similar to the *Commercial*, is near the finish mark at Marine Welding and Repair Works, Miss. The 50 x 16 ft. craft will be equipped with two 6-71 GM (Detroit) engines for the rated 330 hp.

ON the lower Mississippi River waters, the *Craig M* was active for A. L. Mechling Barge Lines. Built by Dravo, the two-year-old towboat, sister to the *Lynn B*, is powered by Enterprise engines totalling 2560 hp.

THE *Beryl* was spotted, turning in a neat push-performance for owner Cumberland River Sand and Gravel Company with power provided by two Waukesha Defender turbocharged engines.

PRODUCED by Dravo in 1956 for Union Barge Lines, the towboat *Western*, was using its 3500 hp from White Superior supercharged engines for profit in the lower Mississippi waters. The 166 x 36 ft. craft is noted for fuel capacity, adequate for a round trip from Pittsburgh to New Orleans.

THE upper Mississippi River saw the towboat, *Arrowhead*, southbound in good time. Built two years ago at St. Louis Shipbuilding and Steel Corp., the 130 x 33 ft. vessel has a good work record with 2600 hp from two Cooper-Bessemer engines.

OVER on the Ohio, *Valley Transporter* continued to pile high its impressive service record for owners MVBL. The 200 x 45 ft. boat, one of the biggest pushers on inland waters gets the conservatively rated 4200 hp from two Nordberg Supairthermal engines.

OHIO River Company's *John J. Rowe* was back in the upper Ohio River coal

trade with power supplied from three Baldwin-Lima-Hamilton six-cyl. engines rated at 1080 hp each.

AT Paducah, Ky., the big-timer, *Baby Lear*, a 1955 production from Nashville Bridge Co., was spotted. The 139.5 x 35 ft. towboat is a steady coal pusher with 3200 hp gained from two GM (Cleveland) engines Model 16278A.

TWENTY-THOUSAND tons of grain made up the single-tow record on the Illinois, adequately handled by the *Eleanor Gordon*. The 15 barges were pushed with power from two GM Model 8-498 turbocharged engines rated at 2700 hp.

AN old boat with a new owner is the long-popular *Patrick Gass*, purchased from US District Engineer Office Omaha, Neb., by D. E. Colborn, Economy Boat Store, Ill. Built 24 years ago, rebuilt in 1950, the rated 600 hp comes from two Superior engines.

CHEMICAL STATE, a reliable performer in southern waters for owners Big State Barge Co. was another reportedly busy boat. The craft is powered by two Caterpillar engines, rated at 450 hp each through Western Gear's Sea-Master Model 108 hydraulic reverse-reduction gears.

SPECIAL thanks to a Pascagoula, Miss., reader for the photo of the *Dallas*. Built in 56 by Arnold V. Walker yards for Coyle lines, the boat-beauty has two Fairbanks-Morse engines for ample 1170 hp.

Announce ASME Gas Turbine Conference Dates and Locations

Conference and exhibition dates for the Gas Turbine Power Division of The American Society of Mechanical Engineers for the years of 1959 through 1964 were recently announced by the Division's Executive Committee.

- 1959* March 8-11 Cincinnati, Ohio
Netherland Hilton Hotel
- 1960* March 6-9 Houston, Texas
Rice Hotel
- 1961* March 5-9 Washington, D. C.
Shoreham Hotel
- 1962 March 4-7 Cleveland, Ohio
- 1963 March 3-6 Los Angeles, Calif.
- 1964* March 1-5 Washington, D. C.
Shoreham Hotel

*Dates certain with Hotel

New Hilliard Filter Bulletin

Hilco Full Flow Filters with many new features are described in a new bulletin just issued by The Hilliard Corp., Purifier Division of Elmira, N. Y., manufacturers of oil purification equipment.

The new oil filters are designed for full-flow filtration of diesel, gas engine, turbine, lubricating and hydraulic oils and for filtration of various types of industrial oils, fuel oil, solvents, coolants, etc., used in the manufacturing and chemical process industries. In addition to complete descriptive information about the filters and various cartridges, the bulletin contains an easy-to-read

data table which makes selection of the proper filter convenient. Specifications include maximum engine horsepower with proper filter listed, number of cartridges, etc. Cutaway views of the equipment give detailed construction features. For copy of the Bulletin, write to Purifier Division, The Hilliard Corp., West Fourth St., Elmira, N. Y.

ITS NEW

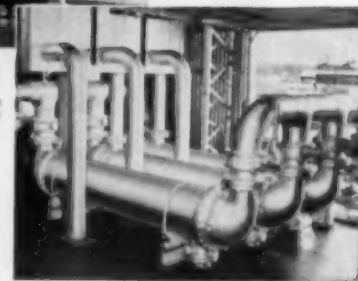
Young cools Diesel Engines on Giant Inshore Drilling Barge!



Barge 2-R, one of the largest inshore barges built, can drill to 25,000 ft. Measures 170' x 45' x 12'. Carries 22-man crew. Has 500 ton derrick 142' high.

Young HEAT EXCHANGERS

USE RAW SEA WATER TO PROVIDE COMPACT, DEPENDABLE COOLING SYSTEM FOR THREE 1000 HP DIESEL ENGINES IN CONTINUOUS OPERATION



Barge 2-R is equipped with a Bethlehem Compound Power Unit with an input of 3000 hp by three 1000 hp diesel engines. Three Young Type "R" Single-Pass Removable Tube Bundle heat exchangers using raw seawater keep the engine jacket water at 167F under the most rigorous operating conditions. The use of zinc pencils in the exchangers keep galvanic corrosion under control. The removable tube bundles make periodic inspection and maintenance fast and easy.

The extra-high capacity of Young Heat Exchangers makes them a logical choice for installations of this nature. They are precision built and engineered to deliver maximum heat transfer per unit volume of space. Young's use of proper construction materials for specific applications . . . accurate, top-quality workmanship . . . careful testing and inspection assure on-the-job dependability. For a solution to your heat transfer problem, call on Young without obligation.

Write Dept. 408-K, for free catalog No. 1158

Young

RADIATOR COMPANY

RACINE, WISCONSIN

Creative HEAT TRANSFER ENGINEERS
Executive Office: Racine, Wisconsin, Plants at Racine, Wisconsin, Matoon, Illinois

24 Diesel Tractors for Interstate



Millous E. Holt (left), president, Elrick Apperley (center), vice president and superintendent of maintenance, and A. R. Metzger, director of operations of Interstate Dispatch, Inc., look over one of 24 new International model AC-225-D

tractors purchased and placed in service as the initial step in a fleet modernization program. The new tractors are powered by 180 hp Cummins diesel engines and have a bumper-to-back-of-cab dimension of 90 in., permitting operation with semi-trailers of greater cubic capacity. The purchase also represents the first step in conversion of Interstate's entire highway fleet to diesel power. Interstate, headed by President Holt, has an annual gross volume of approximately \$5,000,000. Terminals are at Chicago, the headquarters city, Rockford and Rock Island, Ill.; Milwaukee, Wis.; Cincinnati, Dayton and Springfield, O.; Indianapolis and Richmond, Ind., and St. Louis, Mo. The need for higher cube was evidenced in customer surveys conducted in terminal cities. Interstate also offers scheduled LTL departure service out

of its Chicago, Milwaukee, St. Louis, Cincinnati and Dayton terminals. The fleet, which totals 175 trucks, won the Transportation Underwriters' President's Award for improvement in traffic safety in 1956 and 1957.

Cooper-Bessemer Names R. S. Warren Ad Manager



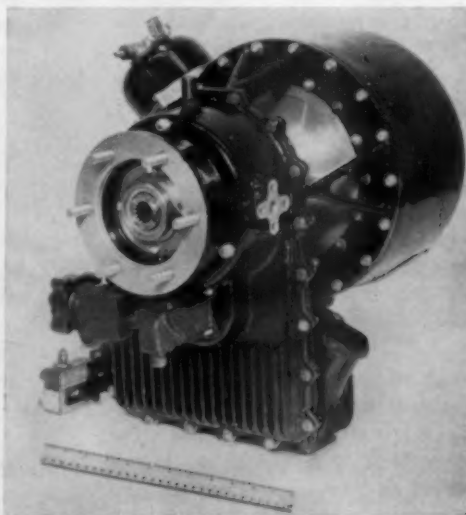
Robert S. Warren

The appointment of Robert S. Warren to the post of Advertising Manager of The Cooper-Bessemer Corp. is announced by Stanley E. Johnson, Vice President and Director of Sales. In his new position, Warren will direct the company's advertising and sales promotion. Johnson

points out. Associated with Cooper-Bessemer's marketing activities for over 14 years, Warren's experience in the many diversified fields served by Cooper-Bessemer provides a unique background for influencing the company's future marketing programs. A graduate of the Cleveland School of Art, Warren also attended Miami University. He joined Cooper-Bessemer in 1945 and later became associated with the Griswold-Eshleman advertising agency at Cleveland, Ohio, as Account Executive on Cooper-Bessemer account and other industrial accounts. Mr. Warren's appointment fills the vacancy created by the sudden death of Eugene R. Bonnist who so capably served Cooper-Bessemer for over 35 years and was its advertising manager at the time of his death. Cooper-Bessemer is a leading builder of centrifugal and reciprocating compressors used in the gas transmission industry, in petroleum refining and gas processing and has manufacturing plants located at Mount Vernon, Ohio, and Grove City, Penn.

Garrett Develops 30 HP Turbine

Development of a new extremely small gas turbine power package has been announced by J. J. O'Brien, manager of The Garrett Corporation's AiResearch Manufacturing division in Phoenix.



The new engine which is comparable in size to a typewriter puts out 30 shp is 16 in. high and 13 in. wide and weighs 45 lbs. The tiny turbine, model GTP 30, can serve as a power drive for

The World's Leading Manufacturers of FUEL INJECTION EQUIPMENT for Diesel Engines



Depots and
Service Agents
in over 100 Countries



FUEL INJECTION EQUIPMENT DIVISION

of

LUCAS ELECTRICAL SERVICES, INC.

Head Office: 501 West 42nd Street, New York, New York

Sales Office: 14820 Detroit Avenue, Cleveland 7, Ohio

West Coast: 5025-29 W. Jefferson Blvd., Los Angeles 16, California

Branch Offices: 643 7th Street, San Francisco, California

4937 West Belmont Avenue, Chicago, Illinois

Canadian Distributors:

Joseph Lucas (Canada) Ltd., Head Office: 11 Davies Avenue, Toronto 8, Ontario

Branch Office: 3401 St. Antoine Street, Montreal 30, Quebec

AP 819

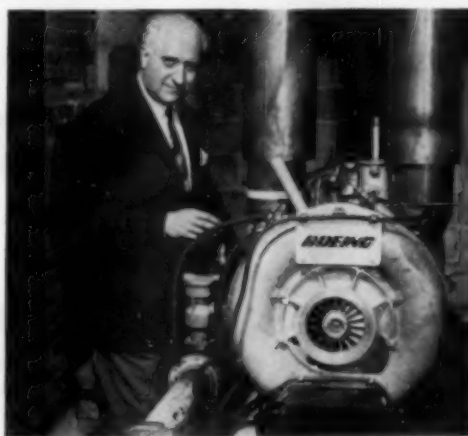
generators, alternators, liquid pumps, freon and air compressors, blowers and other applications requiring shaft power. It is readily adaptable for use on any type of vehicle, boat, aircraft or ground installation and is appropriate for military, industrial and commercial purposes. For aircraft applications the unit can operate from sea level up to 20,000 ft. Output shaft speed is available in either 6000 or 8000 rpm.

ITS NEW

S.I.T. Opens Turbine Laboratory

Stevens Institute of Technology has opened its gas turbine laboratory, the only one of its kind on an American engineering college campus. Donated to the Mechanical Engineering department by Boeing Airplane Co. of Seattle, the turbine was designed originally to start the Boeing B-52, the six-engine jet bomber. According to Professor Kurt H. Weil, head of the Stevens ME department, the turbine will be used to conduct several research projects. The research will be under the direction of Professor of Mechanical Engineering P. Frank Martinuzzi. One of the important problems to be investigated is the utilization of the large amounts of energy which are lost in the form of heat through the exhausts of gas turbines. Industry is vitally interested in any knowledge which will make possible the more complete and efficient use of fuel in these machines. In his research projects, Professor Martinuzzi will proceed along new and unconventional lines in an attempt to solve this problem. The Stevens turbine is installed in a cell with armour-plated cinder block walls, a steel door, and a bulletproof glass window. All

controls are on the outside of the cell, and the operator can run the machine and observe its



Dr. P. Frank Martinuzzi and the Boeing turbine.

performance through the glass window. The turbine drives a centrifugal air compressor, thus affording a valuable air source to be utilized for experimental purposes. It runs at an operational speed of 34,000 revolutions per minute, about 560 revolutions per second.

HERE IS IMPORTANT INFORMATION! The completely new 1958 edition of the **DIESEL ENGINE CATALOG**, Volume 23, is now available. If you design, purchase, sell, operate or service diesel, dual fuel or gas engines, the Catalog is essential to you. This giant, 400 page, 10 1/2" x 13 1/2", fully illustrated reference book has been revised, rewritten and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs \$10 postpaid plus California sales tax where applicable. Send checks or company orders to **DIESEL ENGINE CATALOG**, 816 N. La Cienega Blvd., Los Angeles 46, Calif.

new answers to these DIESEL PROBLEMS

IN ALLIED'S NEW DIESEL DATA BROCHURE 10-X-552

This new fact-filled brochure gives latest Engineering Data on corrugated steel and stainless steel Diesel exhaust and air intake lines . . . installation diagrams and tables plus analyses of Diesel engine pipeline problems . . . how Allied's 10-X and 21-X overcome vibration, expansion and contraction, misalignment, engine pulsations, offset.

WRITE, WIRE, PHONE FOR YOUR COPY TODAY!

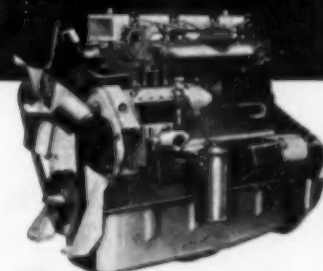
ALLIED METAL HOSE CO.
3749 Ninth Street, Long Island City 1, N. Y. • Stillwell 4-5173

EXHAUST VIBRATION
PIPE EXPANSION
FLANGE
MISALIGNMENT
ENGINE PULSATIONS
OFFSET MOTION
OIL LINES
AIR INTAKE



PERKINS...

can help you
sell more
equipment on
a world-wide
scale!



450,000 Perkins diesel engines
are now in use in 163 countries of
the world—in 423 applications.

F. Perkins Ltd. have sales, service and parts outlets in 106 countries. Versatile Perkins engines are available to the specifications of your engineering department, anywhere in the world.

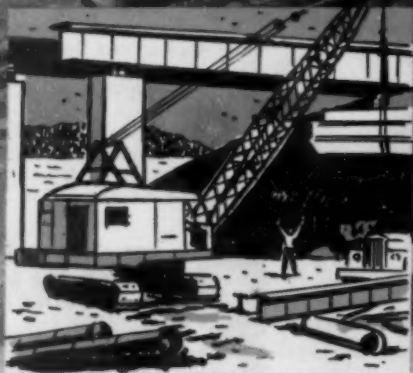
This means you can have your equipment shipped anywhere in the world—without motors—at less cost to you and your distributor. Your customer can then readily install a Perkins diesel package, tailored to your application and approved by your engineering department, at destination point. This would also reduce the dollar cost of the equipment, important to customers in the non dollar area.

Perkins maintain an engineering staff in Toronto, Canada. Phone them—they will fly down and discuss applications with you. Prototype installations can be made at Toronto or at your plant.

Cut shipping costs and assembly problems . . . call or write Perkins' Toronto office.

Perkins
F. PERKINS (CANADA) LTD.
80 WINGOLD AVE. TORONTO, ONTARIO
Distributors in Canada from coast to coast. S716

crank engines



FOR CONSTRUCTION



FOR TRUCKING



FOR MARINE USE

HYDROTOR—proved best by far for performance, for dependability, for low over-all cost.

AMERICAN BOSCH ARMA

lightning fast—

with OIL!

- Sure, split-second starting—even in sub-zero weather
- Cranking power always available—even after months of idleness
- Safe: spark and explosion proof. Light in weight
- Low cost: saves battery, down-time and maintenance expense

Here's a proved cranking system that spins engines 2 to 3 times faster—in torrid heat or freezing cold. It's the American Bosch HYDROTOR—the hydraulic cranking system that puts real muscle into engine cranking—eliminates battery and starter troubles, reduces down-time expense—saves you real money on maintenance and repairs.

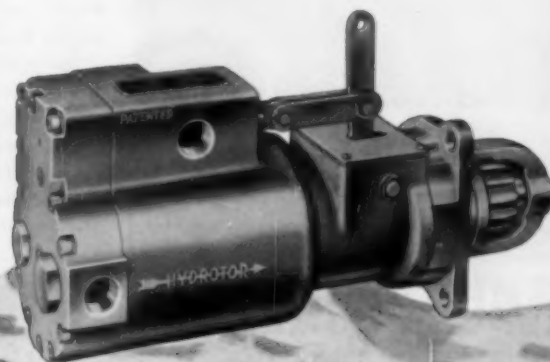
You'll want to learn more about HYDROTOR—the

revolutionary system that uses oil under high pressure to crank diesel or gasoline engines *faster with greater power*. You'll want the outstanding performance and dependability—the economy of HYDROTOR for your engines. Send coupon today for free brochure H110-02-2 and the name of your nearest Hydrotor distributor. American Bosch Division, American Bosch Arma Corporation, Springfield, Massachusetts.

6351



FOR OIL FIELDS



American Bosch Division
American Bosch Arma Corporation
Springfield 7, Mass.

- ☐ Please send brochure H110-02-2 and name of nearest Hydrotor distributor.
- ☐ Please have salesman call.

Name _____

Company _____

Address _____

City _____ State _____

CORPORATION

Diesels All Around

The World

By F. Hal Higgins

UNION Lumber Company is building a new truck and tractor shop at its Fort Bragg, California, headquarters. This diesel fleet at Union's operations here includes 12 Kenworths, 3 leased Peterbilts, 3 Internationals as water wagon, tire truck and low bed. The D8 tractor with bulldozer on its nose is building fire access roads. Union has built and owns approximately 150 miles of such roads to aid in protecting its timber against forest fires. The roads also serve as fire breaks in many areas. Cummins, P. & H., Cat and Buda power trucks, locomotives and cranes; tractors are Cat and International; road graders Cat and Adams; mobile loader and wheel tractors, Cat.

REPORTS from Nebraska Test officials

reveal Oliver's 770 and 880 diesel tractors have just gone through the tests at 46.8 and 54.97 hp at sea level for drawbar pull. Both models have Oliver engines.

PROBLEM of compacting fill on roads, streets, air fields, dams, etc., is getting increasing attention from manufacturers of rollers, compactors and tampers. The newest is Buffalo-Springfield's 3 axle tandem vibratory roller, the KX-25EV. The vibrating roll is in the center position. With two engines, one powering the vibrating action of the roll, the operator can regulate vibrations through throttle control cable. Vibration may be turned off while traveling when so desired. The Buffalo-Springfield compacting rollers at work on the big freeway job around Walnut Creek are powered by Cummins and Caterpillars.

KAISER Steel Corp. is using a new fleet of Kenworth 64 ton 803-B trucks to move waste from its Eagle Mountain

mine. Here is the largest body of high grade iron ore in the west. Rated payload is 64 tons.

MARION walking draglines are making coal stripping history in New Brunswick, Canada. The first Marion went on this job 11 years ago, and three more have been added since. Over-burden averages 45 ft. at the four pits. Instead of loading shovels for these electric Marion draglines, Allis-Chalmers thrust type front-end loaders are used to load direct from the coal seam into the three 22-ton Euclids, two 15-ton GMC's, a 15-ton Mack and five 4-ton GMC's. All trucks are rear-dump.

ARGENTINA has gone into the manufacture of combined harvesters in a big way. There are 22 different companies manufacturing combines this year with most of them powering with Perkins diesels in two sizes—L4 and P6.

DAVID Brown found its 1956 exhibit at Poznan won them a foothold that increased sales four times the first year's in that Polish area. Hence, the company is showing for its third year at Poznan. It is the David Brown diesel that is the big item. Diesel sales rose from 31% to 43% of the total tractor sales in Holland in the last two years, according to a recent census by the government.

GRADING Land for Surface Irrigation is the title of Circular 438, California Agricultural Experiment Station Extension Service. This 48 page item is well illustrated with drawings and photos of diesel-powered tractors, scrapers and land levellers. Allis-Chalmers, Cat, International, Oliver diesel power and teamed equipment, as well as lighter Willys Jeeps pulling smaller equipment. While land levelling for agricultural use has been done in the irrigated areas of the west for the last 75 years or more, it was not till the World War II era that it got so much attention by both farmer and custom contractor. Hundreds of millions of dollars have been "plowed back" into the farms of the west in the past 15 to 20 years by big diesel crawler tractors moving scrapers and pushing bulldozers.

LIQUID concrete land drains are being tested in the ministry of Land Drainage Department for Operational development in Great Britain. A Fowler diesel track layer tractor carries the special equipment for mixing and placing the concrete. Costs are but 25 to 30 percent of tile-laying, it is claimed.

NEBRASKA Tests on the Minneapolis-Moline 5 Star diesel, the Ford 841 and 851 diesels, and the Oliver OC4 diesel have just been completed and the data sent out. Sea level drawbar horsepower

on these tests: Minneapolis-Moline 51-80; Ford 841 was 37.75, and on its 851 it was 38.90; for the Oliver OC-4 it was 24.75.

J. I. CASE Company has just bought itself a "stack of blue chips" in the European tractor market by buying controlling interest in the 104-year-old Societe Francaise Vierzon. Case lines of diesel crawler and wheel tractors and heavy equipment will be turned out from the French factory.

BRITAIN'S Royal Show at Bristol in July brought out a new series of air-cooled diesels by R. A. Lister & Co. Light in weight and competitive in price are the HA2 and HA3 in 20 and 30 hp sizes. As power for balers, combines, corn mills and grain driers, they are expected to get a big demand. Generous use of light alloys has cut weight. Lister now has a range of seven models from 3½ to 30 hp in diesels.

N. P. NELSON Iron Works, Incorporated, Clifton, N. J., is out with one more tractor shovel. Its first model, the 200 is a 4-wheel drive powered by either Continental gas or GM diesel 3-71. The Allison torque converter is of the planetary type. All clutches are hydraulically operated and run in oil. Rear axles disconnected for highway travel, it is aimed at the mining and excavating fields.

INTERNATIONAL'S Utility 350 tractor permits one man to do the work done by seven for the Larsen Canning Co. of Green Bay, Wis. With fork-lift on rear and seat reversed, the tractor operator handles 710 lb. pallet boxes from three mechanical bean harvesters to replace the old methods of sacked beans and hand methods.

THE seven Wagner Brothers of Wagner Tractor, Inc., at Portland, Ore., have announced their 1959 Cummins-powered agricultural tractors in seven models: TR-6, TR-9, TR-14 and TR-24 with TRS models for the first three. Tires, pumps and valves differ for the TRS models. Dozer blade and scraper attachments may be adapted to them.

ADAMS 550 model Power-Flow graders give buyers a choice of either GM 4-71 or Cummins NHC-4-BI diesels, each with 135 hp. Torque converter is Adams adapted single-stage type, multiplies torque 3 to 1. Engine is rubber mounted to eliminate vibration to operator. Le-Tourneau Westinghouse Co. is building the Adams line since acquiring it some months ago. This is the company's second torque converter grader.

BRITISH tractor production for 1957 set an all-time record of 147,095 units. Rising exports of British diesel-powered tractors was a big factor.

AGAIN! SILENCER BY MAXIM



The 1600 H.P. Cleveland Diesel on the *Frances Turecamo*, most modern of tugboats, is efficiently and dependably serviced by a Maxim Spark Arrestor Silencer.

Maxim is consistently the choice with owners and operators who prize the advantage of time-tested, proven performance. Make Maxim your choice — your first cost is your last one.

THE MAXIM SILENCER COMPANY

Subsidiary of Emhart Manufacturing Company

94 HOMESTEAD AVENUE, HARTFORD, CONNECTICUT

THE MAXIM SILENCER COMPANY Subsidiary of Emhart Manufacturing Company
94 HOMESTEAD AVENUE, HARTFORD, CONN.

Please send me bulletins on: ☐ Waste Heat Recovery ☐ Air Compressor intakes and discharges
☐ Internal combustion and steam engine exhaust and intake ☐ Steam, air or gas discharges
☐ Blower intakes and discharges ☐ Jet airplane engine exhaust and intake

NAME _____

COMPANY _____

ADDRESS _____

Brush Aboe Changes Name

Orenda Engines Ltd., leading manufacturer of jet engines in Canada, recently announced extensive plans for industrial expansion in the United States and Canada. To further these plans, they have formed a new company, Orenda Industrial Ltd., with head offices in Toronto, and a subsidiary company in New York, Orenda Industrial Inc., formerly Brush Aboe, Inc. From their new and enlarged offices at 34-14 58th Street, Woodside, N. Y., Orenda Industrial Inc. will continue to market the products of the Brush Group of companies in England, which include the well established diesel engine lines of Petter, McLaren, National and Mirreles, ranging in size from 1½ to 4000 hp for industrial and marine applications, together with the electrical products of the Brush Electrical Engineering Co., Ltd. The Brush Group, which has over fifty years of experience in the diesel and electrical fields, only recently became a part of the Hawker Siddeley Group of England, along with A. V. Roe Canada Ltd., of which Orenda Engines is a member company. With this backing, both in England and Canada, Orenda Industrial Inc. plan to expand their operations in this country and extend their sales and service coverage throughout the U. S. for Petter engines. As one of their first steps in this direction, they are opening an office in San Francisco to cover the west coast.

Hince Named To Electro-Motive Post

Appointment of H. S. Hince as sales promotion manager is announced by Volney B. Fowler, director of public relations, Electro-Motive Division of General Motors. Born in Hartford, Connecticut, Hince attended school in Oak Park and was graduated from Wright Junior College of Chicago. Mr. Hince joined Electro-Motive as a stock arranger in the parts department in August of 1942. After successive jobs in the parts warehouse, he became a parts catalog writer and in 1954 was made merchandising specialist, which assignment was followed by a promotion in May of 1956 to senior merchandising specialist, the job he held prior to his present assignment.

V Engine Bulletin Published

Complete line of Nordberg four-cycle V-type engines is described in a new two-color, 18 page bulletin recently released by Nordberg Manufacturing Company, Milwaukee, Wisconsin. Examples are shown of the advancements in diesel engine performance for V-type engines that are supercharged, super-

charged and intercooled and Supair-thermal. Operated on diesel, Duafuel or spark-ignition gas the engines described are available in 12 or 16 cylinders with 13 in. or 13½ in. bore and 16½ in. stroke. Outstanding design and construction features are explained. Engine components are shown and described in an interesting and educational manner. The Supairthermal principle is fully described with the help of pictures. Several cross section drawings help to explain operation of this engine. Included with the new bulletin are supplements are specification sheets covering V-type engines for generator sets and pipeline applications and two for marine propulsion. One covers the conventional type reduction gear and the other covers the Nordberg designed in-line reduction gear.

(ITS NEW)

Temperature Control Literature

The latest technical literature on United Electric Controls Co. Type C11 temperature control is now available. Type C11 is a wide range temperature control, excellent for use in engine cooling systems and marine applications. This control is a rugged heavy duty control having water, vibration and shock resistant features, including heavy bronze case, steel bearing surfaces and cover gasket. Electrical rating on this control is standardly 15 and 20 amps 115/230 volts AC, with many types of switches available. All switches are single pole and suitable for 180° F ambient temperatures. Type C11 control is flexible in design and can be adapted to meet a great variety of applications. For additional information write to United Electric Controls Co., 79 School St., Watertown, Mass.

(ITS NEW)

New Pressure Switches

A new line of dual circuit pressure switches designed to actuate instruments, warning signals, safety devices, etc., and which are used in many ways to make or break electrical circuits, has been announced by the John W. Hobbs Corp., a division of Stewart-Warner Corp. Switches are furnished for direct current use in three ranges 3-6#, 7-14#, and 15-60#. At zero pressure, one circuit is normally closed and the other circuit normally open. These switches are preset at the factory and the customer has only to specify the pound setting required in both circuits within the ranges specified above. In operation with a low pressure warning device, a red warning light may be on at a predetermined low pressure. As the pressure rises to a safe operating point, the red light goes off and a green light comes on giving visible indication of safe operating pressures. Wide usage is

found for these dual circuit switches when it is desirable to lock out one electric circuit while another is in operation, such as locking out the starting motor while the engine is running. The new switches have a nonferrous pressure chamber; phosphor-bronze diaphragm, and alloy contacts. Small, the units are 1½ in. in diameter and are easily installed with ½ in. pipe thread. All switches are pressure assembled and pretested at 150 psi. Catalog PS 605 covering the complete line of pressure switches is available from the John W. Hobbs Corp., Yale Boulevard and Ash St., Springfield, Ill.

(ITS NEW)

Preventing Pulsation Trouble

A serious pulsation condition was prevented at the Downingtown, Pennsylvania, compressor station of The Manufacturers Light and Heat Company by the installation of Burgess-Manning snubbers. Both inlet and discharge snubbers were installed on the two three-compressor cylinder 1100 hp Ingersoll-Rand compressor units. A pulsation survey using an oscilloscope showed that, at an engine speed of 335 rpm and 235 psig line pressure, a peak pressure change ranging from 12.15 psi to 7.33 psi in the suction nozzles between the compressor cylinders and the inlet snubbers was prevented from entering the piping system by the inlet snubber as evidenced by a peak pressure change of only 3.06 psi upstream of the inlet snubber. Also, the pulsation survey showed that, at an engine speed of 335 rpm and 1005 psig line pressure, a peak pressure change

ranging from 40.3 psi to 89.0 psi in the discharge nozzles between the compressor cylinders and the discharge snubber was reduced by the snubber to a peak pressure change of 4.72 psi downstream of the discharge snubber. Percentage-wise, the residual pulsation from the suction lateral has been held to a maximum of approximately 1.2% of absolute line pressure, and in the discharge lateral the residual pulsation was held to a maximum of 0.6% of the absolute line pressure. This residual pulsation was relatively slight and it is considered very satisfactory with this type of operation. Information regarding the elimination of the discharge or intake pulsation in key pipeline systems is available from the Burgess-Manning Company, Industrial Silencer Division, 749 East Park Avenue, Libertyville, Illinois.

Fuller Transmission Movie Available

A color-sound movie for operators of heavy-duty earthmoving and mining equipment using the 9-speed, single-stick Fuller R-1550 RoadRanger Transmission has been produced by Fuller Manufacturing Co. and is now available for showing. The film is 16 mm size and explains in graphic detail how to properly shift the closely spaced gear ratios for maximum performance with diesel engines in the 1550 cu. in. class.

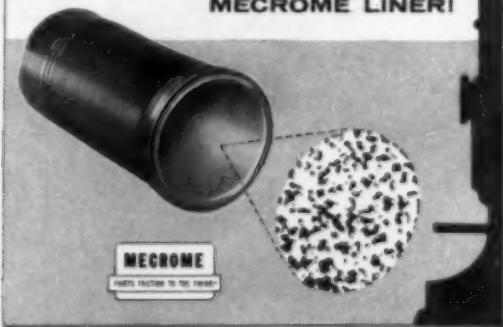
The new movie may be shown on request by writing Fuller Manufacturing Co., Kalamazoo, Mich.

(ITS NEW)

"MUST READING"
for every
Diesel Engine
user!



Let's put the microscope on a
MECROME LINER!



MECROME LINER BOOKLET...

Want to know how to increase liner life... reduce premature cylinder change-outs... increase ring life? It's all in this well-illustrated booklet that's "must reading" for you! This informative folder shows how we provide liners with stable chromium plated bearing surfaces with Mecrome controlled porosity that materially increase cylinder life. Mail the coupon for your complimentary copy.

METAL FINISHERS, INC.
1725 East 27th Street, Cleveland 14, Ohio
Please send without obligation a copy of your liner booklet.

Name _____
Company _____
Address _____
City _____ Zone _____ State _____

MECROME

FIGHTS FRICTION TO THE FINISH

METAL FINISHERS, INC.

1725 E. 27th ST. • CLEVELAND 14, OHIO • TEL.: MAin 1-0511
3125 BRINKERHOFF ROAD • KANSAS CITY, KANSAS
IN CANADA: NATIONAL HARD CHROME PLATING CO. LTD., TORONTO, ONT.

NO LUBRICATION
NO MAINTENANCE
NO WEARING PARTS

Specify
THOMAS
ALL METAL
FLEXIBLE COUPLINGS
FOR MAINTENANCE FREE
POWER TRANSMISSION
on PUMP, COMPRESSOR,
MARINE and
OTHER DRIVES



DBZ — for high speed, heavy duty drives

Thomas' 40 years of flexible coupling experience is at your disposal to help you meet ordinary applications or special variations for unusual cases.



FLOATING SHAFT
RMR — for heavy duty service with excessive misalignment



SINGLE FLEXING
SS — for engine-driven generator sets with out-board bearings



DOUBLE FLEXING
AMR — for engine and medium speed drives

UNDER LOAD and MISALIGNMENT
ONLY THOMAS FLEXIBLE COUPLINGS
OFFER ALL THESE ADVANTAGES.

- 1 Freedom from Backlash
Torsional Rigidity
- 2 Free End Float
- 3 Smooth Continuous Drive with
Constant Rotational Velocity
- 4 Visual Inspection While
in Operation
- 5 Original Balance for Life
- 6 No Lubrication
- 7 No Wearing Parts
- 8 No Maintenance

Write for Engineering Catalog

THOMAS FLEXIBLE
COUPLING CO.

WARREN, PENNSYLVANIA, U. S. A.

Research Appointments by Electro-Motive

Appointment of David M. Lyon as director of research of Electro-Motive Division of General Motors is announced by N. C. Dezendorf, vice president of General Motors and general manager of Electro-Motive. Mr. Lyon succeeds E. W. Kettering who is appointed research assistant to the general manager. The appointments were effective August 1st. Mr. Kettering has been associated with projects that have contributed to the development of GM diesel locomotives since 1930 when he joined the staff of the Winton Engine Company at Cleveland after studying mechanical engineering at Cornell University. He immediately went to work with the testing group on two-cycle engine



David M. Lyon



Eugene W. Kettering

design at Winton which later became Cleveland Diesel Engine Division of General Motors. He soon became chief test engineer on two-cycle development, working between GM research laboratories and Winton. In 1936, he moved to Detroit to head development of the GM 567 Diesel engine, coordinating the work between Winton, GM Research and Electro-Motive which was just getting into operation at La Grange, Ill. In 1938, Kettering joined Electro-Motive, taking over the engineering group on the 567 engine. He was made senior project engineer in 1942 and became assistant chief engineer in 1944. He was promoted to chief engineer on April 1, 1948. In June, 1955, Kettering was named director of research at Electro-Motive.

Mr. Lyon joined Electro-Motive's mechanical engineering section in 1948 following graduation from the University of New Mexico with a mechanical engineering degree. In 1953, he was one of a few men selected on a nationwide basis for the Sloan Fellowship in the executive development program at Massachusetts Institute of Technology. Upon completion of an intensive one-year program, he was awarded an S.M. degree in Business Administration. He was attached to engineering sales in 1954 and 1955 with responsibilities of investigating market potentialities for new products. He was selected by Kettering to be a member of the research staff formed in 1955 and subsequently was named executive research engineer, the position he held prior to his recent promotion.

Purolator Announces New Appointments

James D. Abeles, president, Purolator Products, Inc., Rahway, N. J., announced two new appointments "as part of the company's planned expansion of engineering facilities and services." Frederick R. Gruner, chief engineer, has been appointed Director of Engineering and will be responsible for all engineering activities of the company. Howard M. Gammon, executive assistant to the

president, has been appointed Chief Engineer in charge of all engineering activities at the com-



Howard M. Gammon



Frederick R. Gruner

pany's central plant in Rahway. Born and raised in Paterson, N. J., Mr. Gruner started work in 1928 as a draftsman for Webster Electric; successively worked for Otis Elevator; Power Transmission Co., Inc. where he pioneered in the design and development of automotive transmissions; the International Business Machine Corp.; and the Allis Chalmers Manufacturing Co. In 1954, Mr. Gruner was named vice-president in charge of operations for Warren Foundry and Pipe Corporation, N. Y. He joined Purolator in 1956 as chief engineer. Mr. Gruner received his BS degree in Electrical Engineering from Cooper Union and MS degree in Mechanical Engineering from Massachusetts Institute of Technology. A registered professional engineer, he is a member of the American Society of Mechanical Engineers; American Institute of Mechanical Engineers; the National Society of Professional Engineers; and the MIT Club.

A native of Los Angeles, Gammon began work in 1948 as test engineer for Thompson Products, Inc., advancing to chief engineer, motor equipment division. In 1957, he joined Westinghouse, specializing in submarine nuclear power plants, and came to Purolator in 1958 as executive assistant to the president. Mr. Gammon, holder of several patents in automotive equipment, graduated from the State University of Iowa with a BS degree in Mechanical Engineering. He is a member of Pi Tau Sigma honorary engineering fraternity; American Society of Mechanical Engineers; and the Society of Automotive Engineers. Mr. Gammon has served on the Co-ordinating Research Council sponsored by the American Petroleum Institute and SAE. He has served on two Aircraft Industry Seminars sponsored by Wright Field as a specialist on water and corrosion problems in aircraft fuel systems.

Where There's Smoke . . .



Smoke II, newest addition to New York's fleet of nine fireboats, cuts through waters off Manhattan on a demonstration run. Said to have a top speed of 24 knots and a 3 ft. 9 in. draft, the

DIESEL PROGRESS

new tender is an example of the growing preference for a high speed, shallow draft type of fireboat, particularly suited for operation in shallow harbor areas. Power for the craft is provided by two 300 hp General Motors diesel engines. The craft can seat 20 men in her sheltered cabin and take on up to 40 men maximum to assist the crews of fireboats at fires, bring relief crews to fire fighters on vessels in the harbor or at fires anywhere on the waterfront; and to help protect pleasure craft. The tender is appointed with many advance features including radar and two-way radio. She mounts a 250 gpm pump and is equipped with a mechanical foam system with 80 gal. of foam liquid for extinguishing gasoline and oil fires. *Smoke II* purchased at \$80,000 replaces the original *Smoke*, which was retired from fire-fighting operations in New York harbor in 1955. The steel-hulled newcomer was built by the Equitable Equipment Co. of New Orleans. The craft's diesel plants were supplied by George Engine Co. of Harvey, La.

Neptune Storage Introduces First of New Highway Fleet

If there is a better way to move household goods, Neptune Storage will find it. President David Kirschenbaum of the largest individual mover of household goods and electronic computer systems in the country has a new highway combination his company has just unveiled. The first diesel tractors—White 3400 TD units—are now in service and the first of the firm's new Grumman-Aerobilt Vans is being road tested. The White Diesels are



Here is the first of the new model highway tractors and vans just placed in service by Neptune Storage—the White 3400 TD diesel tractor with the power-tilt cab and the Grumman-Aerobilt Van. Shown at the new combination are, from left: H. D. Weller, Jr., vice-president, The White Motor Co.; Henry Kirschenbaum, treasurer; Robert Kirschenbaum, superintendent of equipment and David Kirschenbaum, president, all of Neptune.

being used on long-distance coast trips where Kirschenbaum anticipates 100,000 miles or more of long-distance moves per unit per year. The tractors are the newest model cab-forward Whites with power-tilt sleeper cabs. They are powered by the 190 hp HRFB Cummins Diesel Engines. In commenting on the use of diesel power tractors Robert Kirschenbaum, superintendent of equipment, said that lower cost per mile and improved schedule time with resulting faster customer service should result. Since we are now operating more than 3 million miles per year, any reduction in operating costs and in the utilization of our equipment is important, not only to Neptune but to our many customers as well.

"TORQUE WRENCH" MANUAL

TORQUE MANUAL

SENT UPON REQUEST

Formulas
Applications
Engineering Data
Screw Torque Data
Adapter Problems
General Principles

PA STURTEVANT CO.
ADDISON QUALITY ILLINOIS

Manufacturers of over 85% of the torque wrenches used in industry

Channelcromium

The HEAVY DUTY chrome plating for diesel cylinder liners in railroad, pipeline, stationary and marine applications.

Write us or call to find out how we can improve lube oil consumption and lengthen engine life. The tougher the job, the better we like it.

PENNINGTON CHANNELCROMIUM COMPANY

319 Dakota St., San Antonio 3, Texas
Phone: CApital 6-8421

NEW SILENCER CATALOG FREE



24 pages of helpful, easy-to-use information on choosing Silencers and Spark Arrestors. Discusses design and construction, sizes and types for every industrial, mobile and marine use.

Write for your copy today.

15 years experience in silence, exclusively!

Kittell

Kittell Muffler & Engineering, Inc.

1977 BLAKE AVENUE
LOS ANGELES 39, CALIFORNIA

ADVERTISERS' INDEX

Air-Maze Corporation, The	66	Garrett Corporation, The (AiResearch Industrial Div.)	Third Cover	Rockwell-Standard Corporation	17
Allied Metal Hose Company	73	General Motors Corp. Delco-Remy Division	22-23	Schwitzer Corporation	4
American Air Filter Co., Inc.	64	Harrison Radiator Div.	2	Sinclair Refining Company	63
American Bosch Division of American Bosch Arma Corp.	74-75	Harrison Radiator Division, General Motors Corp.	2	Snow-Nabstedt Gear Corp.	68
C. A. V. Ltd.	72	Hilliard Corporation, The	12	Solar Aircraft Company	11
Clayton Manufacturing Company	61	Illinois Testing Laboratories, Inc.	24	Standard Oil Co. of California	19
Cook Company, C. Lee	13	Interstate Diesel Service, Inc.	80	Standard Oil Co. (Indiana)	8
Cooper-Bessemer Corp.	Fourth Cover	Kittell Muffler & Engineering Co.	79	Stratoflex, Inc.	60
Curtiss-Wright Corp. Utica Division	18	Lane Plating Works	80	Sturtevant Co., P. A.	79
Dana Corporation	5	Maxim Silencer Co., The	76	Texas Co., The	Second Cover-1
DeLaval Steam Turbine Co.	6	Mercedes-Benz	9	Thomas Flexible Coupling Co.	78
Delco-Remy Division, General Motors Corp.	22-23	Metal Finishers, Inc.	77	Tumpane Company, Inc., The	80
Dumler Co., Ernest W.	80	Napier & Son, Ltd., D.	69	Twin Disc Clutch Co.	10
Eaton Manufacturing Co.	57	National Metal & Steel Corp.	80	Utica Division, Curtiss-Wright Corp.	18
Electric Machinery Mfg. Co.	14-15	Nugent & Co., Inc., Wm. W.	70	Waukesha Motor Company	65
Enterprise Engine & Machinery Co.	16	Pennington Channelchromium Co.	79	White Diesel Engine Div., The White Motor Company	21
Fairbanks, Morse & Co.	67	Perkins (Canada) Ltd., F.	73	Wix Corporation	59
		Purolator Products, Inc.	20	Young Radiator Company	71

Grinding and Hard-Chrome Plating of Diesel Engine Crankshafts—Railroad Sizes Down



A pioneer in hard chromium plating in this country.
A pioneer in chromium plating diesel crankshafts.

LANE PLATING WORKS

Experience • Quality • Precision

5322 Bonnie View Road • P.O. Box 9115
Phone FRanklin 1-1351 • DALLAS, TEXAS

Progressive engine manufacturer has opening for a diesel engine sales regional manager to cover the Midwest area contacting OEM and distributor accounts.

DIESEL PROGRESS, File No. 540, 816 N. La Cienega Blvd., Los Angeles 46, Calif.

WANTED

Diesel Mechanics—Electric Power
Plant Operators—Chief Power
Plant Engineers—European and Middle East

Premium Pay and Fringe Benefits

THE TUMPANE COMPANY, INC.
P. O. Box 1168, Terre Haute, Indiana

ARE YOU HAVING WATER TROUBLE IN YOUR DIESEL FUEL?

MAYBE WE CAN HELP YOU.
PHONE, WIRE OR WRITE US.

INDUSTRIAL • FILTRATION SERVICE • AUTOMOTIVE

Ernest W. Dumler Co., Inc.

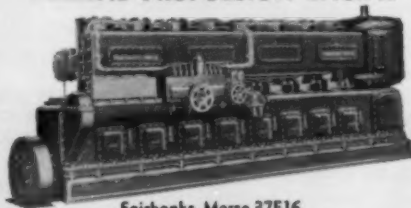
DEVELOPMENT — ENGINEERING — RESEARCH

6324 PENN AVE.

PITTSBURGH 6, PENNSYLVANIA

PHONE HIland 1-4578

NEW • UNUSED CURRENT MODEL MARINE PROPULSION ENGINE



Fairbanks-Morse 37F16
7 cyl. — 1400 HP — 300 RPM
Direct reversible • Top ABS-Rating
Priced To Move

DIESEL DIVISION

National Metal & Steel Corp.

TERMINAL ISLAND (Los Angeles Harbor), CALIF.

PHONE: NEvada 6-9871

**SAVE MONEY
WITH
Interstate**
diesel service incorporated
2093 East 19th St., Cleveland 15, Ohio

America's largest GM fuel injector rebuilder

POWER BOOSTING RICHFIELD'S 2-CYCLE GAS COMPRESSORS



Richfield Oil Corporation's compressor installation at Coles Levee, California, is one of several which have accumulated thousands of hours of trouble free operation with the Multiple AiResearch Turbocharger System.

*...The Multiple **AIRESEARCH** Turbocharger System*

has helped solve the Richfield Oil Corporation's need for more power to meet increased demands at its compressor stations. Turbocharging the 2-cycle natural gas engines with the Multiple AiResearch Turbocharger System proved to be an economical and quick

method for boosting power.

The turbocharger installation is simple and clean. Two production-type AiResearch turbochargers are mounted directly on the exhaust manifold. The compressed air is directed to the engine intake through an AiResearch inter-

cooler. This increases engine output from 300 H.P. to 375 H.P.

AiResearch is a leader in the development and production of air-cooled turbochargers and turbocharger controls for all major diesel engine applications.

Your inquiries are invited.



AiResearch Industrial Division

9225 South Aviation Blvd., Los Angeles 45, California

DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND SPECIALIZED INDUSTRIAL PRODUCTS

power stamina
a **MUST** for the
arctic's "jack of all
trades"



The 180-foot light cargo carrier "Redbud" is capable of 12 knots from her twin 700 hp Cooper-Bessemer marine Diesel engines.

Demanding service and extreme operating conditions provide a yardstick for Diesel performance. Consider the record of the USNS "Redbud" assigned to the Navy's Military Sea Transportation Service. In addition to cargo service in arctic waters, this Cooper-Bessemer powered multi-purpose vessel handles ice breaking duty in the Goose Bay area. Although not designed as an ice breaker, the "Redbud" has the power and bow characteristics to clear ice two feet thick. The charting of ice packs and glaciers is another of the difficult and demanding jobs assigned the "Redbud". Often referred to as the sea going "jack of all trades" this veteran Arctic ship with her twin 700 hp Cooper-Bessemer Diesels, handles such additional work as long distance towing, passenger service, search and rescue, surveying for safe channels, laying

mooring buoys and erecting navigational aids. Regardless of assignment . . . with Cooper-Bessemer power in the engine room there's assurance of peak availability and Diesel efficiency at its economical best. For marine Diesels in the 200 to 5000 hp range, make sure you know the Cooper-Bessemer performance story. Contact the Cooper-Bessemer office nearest you for complete information.

Cooper-Bessemer

GENERAL OFFICES: MOUNT VERNON, OHIO

ENGINES: GAS - DIESEL - GAS-DIESEL
COMPRESSIONS: RECPROCATING AND CENTRIFUGAL
ENGINE OR MOTOR DRIVEN

BRANCH OFFICES: New York City, Seattle, Wash., Chicago, Ill., Houston, Texas, Washington, D. C., San Francisco & Los Angeles, Calif., St. Louis, Mo., Gloucester, Mass., New Orleans, La.